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# GS1 Healthcare US®

# Implementation Guideline

## Applying the GS1 Lightweight Messaging Standard for DSCSA Verification of Product Identifiers

*Release 1.3.1, July 25, 2023*

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# Document Summary

| Document Item | Current Value |
|---|---|
| **Document Title** | Implementation Guideline: Applying the GS1 Lightweight Messaging Standard for DSCSA Verification of Product Identifiers |
| **Document Description** | The purpose of this document is to assist the U.S. pharmaceutical industry in implementing the GS1 Lightweight Messaging Standard to support DSCSA product identifier verification. It provides essential technical information including localization query parameters and settings, the openAPI schema, configuration and set-up, verification requests, and verification responses. |

# Change Log

| Date | Change |
|---|---|
| **March 31, 2020** | Publication |
| **November 30, 2021** | Updated to include information on Authorized Trading Partners. |
| **October 5, 2022** | Updated to expand verification usage beyond saleable returns |
| **July 7, 2023** | Update contact data elements<br>New OpenAPI file |


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# 1 Introduction

The Drug Quality and Security Act (DQSA) was enacted by Congress on November 27, 2013. Title II of DQSA, the Drug Supply Chain Security Act (DSCSA), outlines steps to achieve an interoperable, electronic tracing of products at the package level to identify and trace certain prescription drugs as they are distributed in the United States. As part of those requirements, product verification is required by law in certain circumstances. The law is being enacted in a stepwise fashion with requirements increasing as milestones are met. The stepwise process will reach its final phase on November 27, 2023, ten years after enactment.

Commencing November 27, 2019, the DSCSA required parties engaged in wholesale distribution to verify the product identifier of returned products before these products can be placed into inventory for resale.[1] The DSCSA defines verification as the process of "*determining whether the product identifier affixed to, or imprinted upon, a package or homogeneous case corresponds to the product identifier assigned to the product by the manufacturer or the repackager*."[2] A manufacturer who receives a verification request from a repackager, wholesale distributor, or dispenser must respond to that request within 24 hours.[3] In preparation, pharmaceutical supply chain stakeholders collaborated with GS1® and GS1 US® to develop a verification messaging standard to enable system interoperability and prevent the proliferation of multiple messaging formats. In addition, the GS1 Messaging Standard Workgroup collaborated with the Healthcare Distribution Alliance (HDA) Verification Routing Services (VRS) Taskforce. These efforts produced the *GS1 Lightweight Messaging Standard for Verification of Product Identifiers*.

The *GS1 Lightweight Messaging Standard* was designed to support Requests and Responses for verification of product identifiers for serialized pharmaceutical products. It is intended to provide a simple, standardized lightweight messaging framework for asking verification questions and receiving actionable information. Designed to support Verification Routing Services (VRS) systems for DSCSA verification, the messaging standard defines a verification Request message and a corresponding Output Response message.

As November 27, 2023 approaches, the increased use and experience of the Verification Routing Service (VRS) utilizing the Lightweight Verification Messaging Standard (LVMS) to operate has identified additional needs beyond saleable returns. The pharmaceutical industry has expanded the use of verification to include suspect or illegitimate product investigations, exception processing and status check.

This Guideline offers an approach to implement that messaging standard for DSCSA verification of product identifiers.

**Important**: As with all GS1 Standards and solutions, this guideline is voluntary, not mandatory. It should be noted that use of the words "must" and "require" throughout this document relate exclusively to technical recommendations for the proper application of the standards to support the integrity of your implementation.

## 1.1 Document Purpose

The purpose of this document is to assist the U.S. pharmaceutical industry in implementing the *GS1 Lightweight Messaging Standard* to support DSCSA product identifier verification. It provides technical information including localization query parameters and settings, the OpenAPI schema, configuration and set-up, verification requests, and verification responses. **It does not provide any guidance or**

[1] Drug Supply Chain Security Act, Section 582(c)(4)(D). Pub. Law No. 113-54, 127 Stat 587, 613 (2013). Retrieved November 3, 2018 from: *https://www.gpo.gov/fdsys/pkg/PLAW-113publ54/html/PLAW-113publ54.htm*
[2] Drug Supply Chain Security Act, Section 581(28). Pub. Law No. 113-54, 127 Stat 587, 605 (2013).
[3] Drug Supply Chain Security Act, Section 582(b)(4)(C). Pub. Law No. 113-54, 127 Stat 587, 610 (2013).

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**advice regarding compliance with applicable law, nor providing any guarantee or warranty with respect to same.**

**Important**: Each company is individually responsible for complying with applicable law. Consult with your company's legal counsel or compliance team (regulatory or quality) for more specific information about current statutory and regulatory requirements applicable to your company and products.

## 1.2 Scope

Under DSCSA, parties engaged in the commercial pharmaceutical supply chain distribution should verify the product identifier of suspect product investigations, illegitimate product investigations, and returned products before these products can be placed into inventory for resale[4], further distribution or dispensing. The response message and this guideline is intended to respond to that need.

DSCSA defines verify as "*determining whether the product identifier affixed to, or imprinted upon, a package or homogeneous case corresponds to the product identifier assigned to the product by the manufacturer or the repackager."*[5] Following that definition, the "verified" field in the response message is used to indicate whether a product identifier submitted in the request message matches a product identifier affixed or imprinted by the manufacturer or the repackager (i.e., true) or not (i.e., false).

**Important: The "verified" field in the response message does not and should not be interpreted as indicating whether a returned product can or should be placed into inventory for resale, further distribution, or dispensing.**

The ultimate decision as to whether a returned product can be placed back in inventory for resale may be subject to and/or dependent on additional regulatory/statutory requirements and/or business considerations. These requirements and considerations are beyond the scope of the response message and this guideline.

Although the response message includes fields for "Reason for Failure" and "Additional Info" to enable manufacturers or repackagers to communicate more information in the message than just whether the product identifier matches if they so desire, it is assumed trading partners will continue to use whatever communication approaches they deem appropriate for those other regulatory, statutory, or business needs.

## 1.3 Normative References

This Implementation Guideline is based on GS1 Standards. The specific standards referenced in this Guideline are listed below, and the relevant provisions of these standards/specifications are to be considered provisions of this Guideline:

- *GS1 General Specifications*
- *GS1 Lightweight Messaging Standard for Verification of Product Identifiers*
- *GS1 Digital Link*

[4] Drug Supply Chain Security Act, Section 582(c)(4)(D). Pub. Law No. 113-54, 127 Stat 587, 613 (2013). Retrieved November 3, 2018 from: *https://www.gpo.gov/fdsys/pkg/PLAW-113publ54/html/PLAW-113publ54.htm*
[5] Drug Supply Chain Security Act, Section 581(28). Pub. Law No. 113-54, 127 Stat 587, 605 (2013).

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## 1.4 Non-Normative References

Material in this Implementation Guideline is based on a number of non-normative guidelines and references available from GS1 and GS1 US. The specific guidelines and documents referenced in this Guideline are listed below.

- *GS1 US Implementation Guideline: Applying GS1 Standards for DSCSA and Traceability*
- *GS1 AIDC Healthcare Implementation Guideline*

## 1.5 Summary of Changes from R1.2

- Expanded the verification context to include verification for a suspect or illegitimate product investigation, exception processing, and status check.
- Added Possession or Control Attestation indicator for the requester.
- Include "ExpirationExtended" and "Illegitimate" to additional information returned in the verification response.
- Added a verification response scenario to address verification of product identifier with an extended expiration date.
- Added Contact information, either email or phone number must be provided, to allow requesters and responders to resolve issues outside of the messaging system.

## 1.6 Contributors

This Implementation Guideline was prepared by GS1 US and the GS1 Healthcare US® Rx Secure Supply Chain Workgroup and was developed using information obtained from a wide variety of members of the U.S. pharmaceutical supply chain from manufacturers to providers.

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# 2 GS1 Standards for DSCSA Product Identifier Data Elements

DSCSA defines the term "product identifier" as, "a standardized graphic that includes, in both human-readable form and on a machine-readable data carrier that conforms to the standards developed by a widely recognized international standards development organization, the standardized numerical identifier (SNI), lot number, and expiration date of the product."[6] Accordingly, a DSCSA product identifier comprises the following four data elements:

- National Drug Code (NDC)
- Serial Number
- Batch or Lot Number
- Expiration Date

(When using GS1 Standards for DSCSA implementation, the NDC is represented by a Global Trade Item Number® (GTIN®)).

These data elements can be encoded in a GS1 barcode using the following GS1 Application Identifiers (AIs):

| DSCSA Product Identifier Data Element | GS1 Application Identifier (AI) |
|---|---|
| GTIN | AI (01) |
| Serial Number | AI (21) |
| Batch or Lot Number | AI (10) |
| Expiration Date | AI (17) |

The concatenated AI element string for encoding those four data elements appears as follows:

**(01)**`{gtin}`**(17)**`{exp}`**(10)**`{lot}`**(21)**`{ser}`

*where* `{gtin}`, `{exp}`, `{lot}` *and* `{ser}` *are placeholders for the actual values.*

These data elements can also be expressed within a single Web URI using the GS1 Digital Link syntax. The GS1 Digital Link structure (or URI template) for expressing the four data elements in the DSCSA product identifier appears as follows:

**https://other.example.com/gtin/{gtin}/lot/{lot}/ser/{ser}?exp={exp}**

*where* `{gtin}`, `{exp}`, `{lot}` *and* `{ser}` *are placeholders for the actual values*

[6] Drug Supply Chain Security Act. Pub. Law No. 113-54, 127 Stat 587 (2013). Accessed November 1, 2018 from: *https://www.gpo.gov/fdsys/pkg/PLAW-113publ54/html/PLAW-113publ54.htm*

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**EXAMPLE** Consider a product instance with the following information:

| DSCSA Product Identifier Data Element | Sample Value | ENCODED AS IN BARCODE |
|---|---|---|
| GTIN | 00361414567894 | AI (01) 00361414567894 |
| Serial Number | 400806 | AI (21) 400806 |
| Batch or Lot Number | 1908642E | AI (10) 1908642E |
| Expiration Date | July 28, 2023 | AI (17) 230728 |

**Those four data elements would be encoded in a barcode using the following concatenated AI element string:**

(01)00361414567894(17)230728(10)1908642E(21)400806

**And they can be expressed in a Web URI format using the following GS1 Digital Link syntax:**

`https://other.example.com/gtin/00361414567894/lot/1908642E/ser/400806?exp=230728`

**Important**: This example illustrates how expiration date is *encoded in GS1 barcodes* and *represented in the GS1 Digital Link* syntax using YYMMDD per GS1 Standards. It is not illustrating how to express expiration date in human-readable presentations on drug packages and/or within systems, which often use YYYYMMDD.

Together, these standardized formats enable users to encode the four DSCSA data elements in a GS1 barcode, express them in a single Web URI, and translate between the two. As such, they provide the foundation for automating the verification of product identifiers using barcoded data and the GS1 Lightweight Messaging Standard, as described throughout the remainder of this document.

**Note about "00" in the day portion of expiration date**

- It is **STRONGLY RECOMMENDED** that the barcode contains an expiration date that includes a year, month, and non-zero day, encoded in YYMMDD format according to the *GS1 General Specifications*.
- With respect to verification of saleable returns, the data encoded from returned serialized products may be scanned with "00" day in the day portion of expiration date. In keeping with United States Pharmacopeia (USP) guidance, which specifies that an expiration date on a label lacking a day should be understood to refer to the last day of the month, verification services and Responders are expected to appropriately handle this scenario as outlined in Section 6.1.1.1.4 of the *GS1 US DSCSA Implementation Guideline, R1.2* and Section 6.2.4 of the *GS1 US DSCSA Implementation Guideline, R1.3*.

**Important**: How the day of the month is expressed for regulated healthcare products will change starting 1 January 2025. As of that date, the day of the month SHALL NOT be expressed as two zeros. A specific day of the month (e.g., last day of July = 31) SHALL be included.


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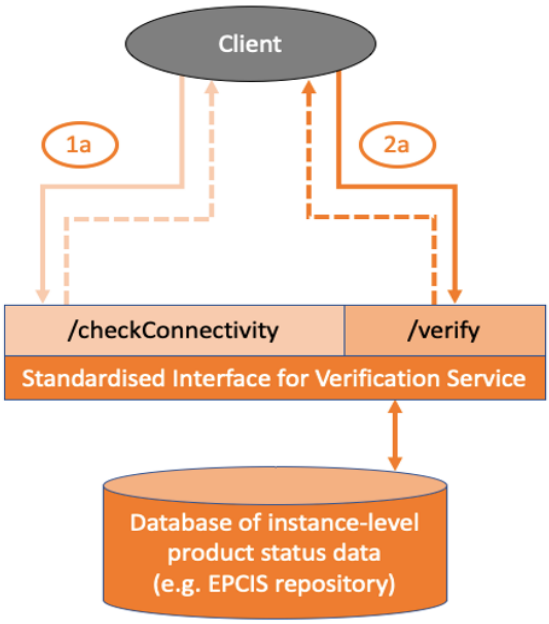
# 3 GS1 Lightweight Messaging Standard for Verification of Product Identifiers

The *GS1 Lightweight Messaging Standard for Verification of Product Identifiers* is designed to support requests and responses for verification of product identifiers for serialized pharmaceutical products. This standard has been developed and designed to support VRS systems for U.S. DSCSA verification of product identifiers. The standard defines a verification Request message and a corresponding Output Response message. It is intended to provide a simple, standardized lightweight messaging framework for asking verification questions and receiving information based on a check of the DSCSA Product Identifier and associated data.

This standard is the first GS1 technical standard to make use of the new GS1 Digital Link syntax. It enables a basic automated check of a serialized product identifier and the associated expiration date and batch number via a lightweight web-based Request/Response message pair, initiated by a simple HTTP/HTTPS GET Request and returning a lightweight machine-readable Response message formatted in JavaScript Object Notation (JSON).

**Note**: Additional information about the GS1 Lightweight Messaging Standard may be accessed through the following link: *https://www.gs1.org/verification-messaging*

**Figure 3-1** Methods by which a client may interact directly with a known VRS system, using either the checkConnectivity method (1a) or the verify method (2a)




In situations where the Requestor does not know in advance which VRS to use for a specific GTIN, they may make use of the resolver or look-up directory infrastructure as shown in **Figure 3-2**. A look-up directory has its own internal database of redirection, which it uses to match against the GTIN within the GS1 Digital Link Web URI, to provide a redirection pointer to the appropriate verification service, depending on information configured by the respective brand owner of that GTIN.

To indicate that the client wants to interact with a verification service, the client specifies within the URI query string a `linkType` value equal to **`'verificationService'`**.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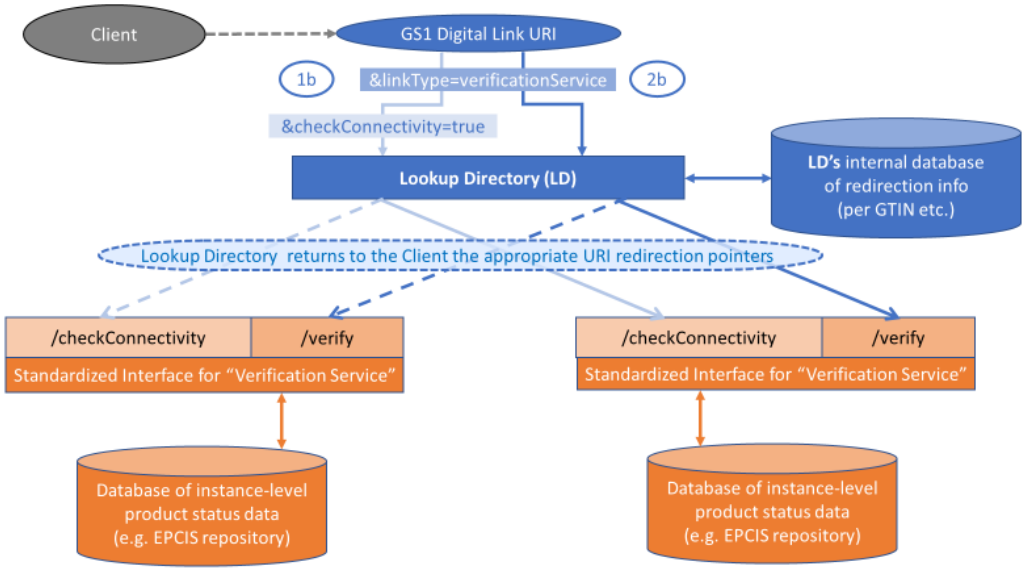
A look-up directory will redirect the Request to the appropriate verification service for that GTIN, and the server for the Responder will respond.

The role of the Lookup Directory (LD) is to provide redirection so that instead of the client maintaining its own lookup table mapping every GTIN to a specific URL of a verification service, a resolver or LD provides up-to-date redirection information.

To distinguish between the two methods (`checkConnectivity` and `verify`) defined for the standardized interface, the client either appends '`&checkConnectivity=true`' to the GS1 Digital Link URI or does not.

**Figure 3-2** A client may use a Lookup Directory infrastructure for GS1 Digital Link to be redirected to the appropriate verification service for a specific GTIN, as specified by the respective brand owner




## 3.1 Relationship to GS1 Digital Link

This standard is the first GS1 technical standard to make use of the new GS1 Digital Link syntax. A GS1 Digital Link resolver is already operational at `id.gs1.org` and can be configured with several typed redirection links by each licensee of a GS1 identification key. One of these typed links can point to the relevant service for verification of product identifiers, as nominated by the respective brand owner.

The team developing the GS1 Digital Link resolver prototype at `id.gs1.org` are carefully examining HDA requirements and draft specifications for Lookup Directories to assure that equivalent functional capabilities can be supported by the GS1 Digital Link resolver at `id.gs1.org`, including the ability to handle redirection to multiple verification services for the same GTIN concurrently to deal with specific merger and acquisition issues (i.e., when mergers and acquisitions of companies and brands require concurrent operations over a period of time during the changeover period while products with the same GTIN from the previous brand owner and new brand owner coexist within the supply chain).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## 3.2 Relationship to EPCIS

This standard is independent of GS1 Electronic Product Code Information Services (EPCIS) and does not require the use of EPCIS, although users are encouraged to implement EPCIS to capture their supply chain events and to leverage the EPCIS query interface to retrieve data to support their response to a Request for product verification. Although EPCIS event data can record the commissioning or decommissioning of products, as well as current disposition (such as 'recalled') and instance/lot master data (such as ’expiration date'), it does not provide a sufficiently convenient interface to perform a simple verification check of product identifiers at batch or serial level.

## 3.3 Security Considerations

DSCSA requires that trading partners interact only with other trading partners that meet the DSCSA defined Authorized Trading Partner (ATP) definition. Although manufacturers, repackagers, wholesalers, and dispensers currently establish the authorized trading partner status of direct trading partners (those that they directly purchase from or sell to), the challenge for trading partners in verification is that the requestor and responder companies involved may represent an indirect trading partner relationship.

While today, trading partners determine the identity and ATP status of their direct trading partners, it is unknowable whether a digital request or response is truly originated with the trading partner that has been verified. This especially holds true as requests and responses are delivered by solution providers on behalf of the trading partner. In this case, there is no physical or digital proof that the trading partner approved of the request or response. In the case of an indirect trading partner, the situation is exacerbated in that the trading partner at the other end of the digital interaction has no knowledge of the requesting or responding trading partner at all.

In order to have a truly secure and trusted Product Identifier Verification interaction, each trading partner involved in the interaction must verify the following about the other trading partner in the interaction:

1. The identity of the trading partner
2. The ATP status of the trading partner
3. That the digital interaction is actually with the trading partner identified in #1
4. That the trading partner authorized their solution provider to participate in the interaction on their behalf.

It is expected that prior to honoring any requests, a verification service or company building their own responding services will take steps to ensure that the Requestor is an authorized trading partner or testing service provider acting on behalf of an authorized trading partner, who has a justification for using the service. Conversely, it is expected that prior to processing the verification response, a verification service or company building their own requesting service will take steps to ensure that the Responder is an authorized trading partner or testing service provider acting on behalf of an authorized trading partner.

Initially, VRS implementations utilize Requestor and Responder Global Location Numbers (GLN)s for confirming ATP status. Subsequently, the pharmaceutical supply chain stakeholders added the verifiable ATP credential approach in demonstrating that a trading partner’s identity and authorized trading partner status have been digitally verified.  Requestor and responder GLNs will continue to be a part of DSCSA verification requests and responses defined in this guideline, even when ATP verifiable credential is included.

As the U.S. pharmaceutical supply chain transitions from using GLN based ATP checks to verifiable ATP credentials, the industry will operate in a hybrid environment. Hence, both methods of ATP checks will need to be accommodated in verification requests and responses. VRS implementations can be configured to activate or not activate ATP Verifiable Credential. Consequently, this implementation guideline will include provisions to support verification requests and responses with and without ATP Verifiable Credentials.


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# 4 Localization Parameters and Settings

The *GS1 Lightweight Messaging Standard for Verification of Product Identifiers* is structured to promote re-use and extension to other industry sectors in all geographic regions. The combination of `linkType` and `context` parameter values in the GS1 Digital Link (Web URI) query string for a verification request provide localization parameters that can tailor the scope of the business rules.

## 4.1 Definition of linkType

`linkType` is a required query parameter included within a URI query string to specify a preferred type of information or service requested by the client. A resolver or lookup directory service can then use the value specified by `linkType` to select which link(s) to return to the client.

### Usage of linkType

**For U.S. DSCSA verification of product identifiers, `linkType` is a required query parameter in the URI query string. To specify the information service for U.S. DSCSA verification of product identifiers, `linkType` must be set to `'verificationService'`.**

## 4.2 Definition of context

`context` is a required query parameter included within a URI query string to provide supporting context information for the scope of the information service indicated by `linkType`.

The `context` query parameter is used in conjunction with the `linkType` query parameter. It has meaning within that `linkType`. Within a `linkType` value of `'verificationService'`, it provides a verification service with `context` about the request, indicating a particular profile, which may indicate whether the verification should be performed in accordance with the rules and semantics of a specific jurisdiction or regulatory scheme.

Possible context values include:

- 'dscsaSaleableReturn'
- 'dscsaSuspectIllegitimate'
- 'dscsaExceptionVerification'
- 'dscsaStatusCheck'

### Usage of context

**Important**: **For U.S. DSCSA verification of product identifiers, `context` is a required query parameter in the URI query string. In this specification, set the value of `linkType` to `'verificationService'` and then set the value of `context` to an applicable DSCSA context type to assure that the verification service that receives the request understands that it should use the relevant context configuration, rules, and interpretation for U.S. DSCSA verification of product identifiers for pharmaceutical products.**

### Possible Context Value Descriptions

These contexts have been deemed necessary by the US Pharmaceutical supply chain in order to support the enhanced requirements of DSCSA involving product returns, suspect and illegitimate products, data exceptions, and status checks to ensure the product is safe to remain in the supply chain.
Possible context values include:


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- 'dscsaSaleableReturn'
  - Requester is seeking to understand the status of a product that is a saleable return prior to further transacting the product.
- 'dscsaSuspectIllegitimate'
  - Requester is performing a verification as all trading partners must perform verification of a product identifier as part of their obligation to investigate suspect and illegitimate products.
- 'dscsaExceptionVerification'
  - Requester is seeking to verify a product after an exception arises with the product in question.
- 'dscsaStatusCheck'
  - Requester is seeking to understand the status of a product that is not a saleable return or known to be suspect or illegitimate.

**NOTE: The verification response should be based on information associated with the product identifier and not dependent on the requested context value. Therefore, the verification response will not vary based on requested context value.**

## 4.3 Definition of ATP-Authorization

`ATP-Authorization` is an optional HTTP header field in the Verification request or Verification response to convey the Verification requestors or responders ATP Verifiable Credential based on the W3C Verifiable Credential standard[7] in JSON Web Token (JWT) presentation form. This field is distinct from the HTTP header field Authorization. This new optional ATP-Authorization HTTP header field is the intended location for implementers to include an ATP Verifiable Credential. When an ATP Verifiable Credential usage is activated in a VRS implementation, the ATP Credential will be utilized in ATP authorization checks. Every verification request or verification response should have a newly generated ATP Credential in JWT format, which may only be used once regardless of whether the server was able to process the request/response or not. While ATP Credential management and verification is outside the scope of this guideline, successful processing of verification requests and responses depend on the validity of the ATP Credential. An ATP Credential that is expired, revoked, or contains an invalid signature will result in the verification service responding with an `HTTP 403 'Forbidden'` response.

The technical specifications detailing the content of the JWT presentation of an ATP Verifiable Credential is defined outside of this guideline.

## 4.4 Definition of GS1US-Version

A GS1US-Version HTTP header attribute has been added to facilitate the association of the verification request and response messages to a specific version of the GS1 Healthcare US Implementation Guideline: Applying the GS1 Lightweight Messaging Standard for DSCSA Verification of Product Identifiers R1.3. Header parameters appear in the header of an HTTP request or HTTP response message. Header parameters are used to define user-defined custom HTTP headers in an HTTP request or HTTP response. This header attribute defines the version of the Implementation Guideline that is being used to notify trading partners and set expectations.

[7] W3C Verifiable Credential Standard: *https://www.w3.org/TR/vc-data-model/*

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# 5 Overview of OpenAPI Schema (including JSON) for Verification Request & Response

The GS1 Lightweight Verification Messaging Standard is a machine-readable specification of the verification message REST interface, using the OpenAPI Specification™ (OAS™).[8] It includes JSON Schema components for validating the structure of the request and response messages in an automated manner to support conformance testing.

This chapter provides high-level information about the schema. To that end, this chapter highlights key structures of the OpenAPI Specification and how they are applied within the GS1 Lightweight Verification Messaging Standard to bring attention to important definitions that should be adhered to by verification service implementations.

- For additional information about the GS1 Lightweight Verification Messaging Standard, see:
  - *Lightweight Verification Messaging Standard v1.0.2* (Jan 2019)
  - *Lightweight Verification Messaging OpenAPI* (Jan 2019)
  - *GS1 US Lightweight Verification Messaging OpenAPI* (**NEW - July 2023**)
- For additional information about the OpenAPI Specification, visit:
  - *OpenAPI Initiative*
  - *OpenAPI Specification*

## 5.1 Available endpoints

In OpenAPI Specification terms, `paths` are endpoints or resources that the API exposes.

There are 2 available paths in *GS1 Lightweight Verification Messaging Standard*: **`/checkConnectivity`** and **`/verify`**.

- The **`/checkConnectivity`** path of a verification service enables a check of system connectivity with the verification service and returns appropriate HTTP status codes.
- The **`/verify`** path of a verification service implements the verification of the product identifiers subject to the rules defined by the context query parameter such as `'dscaSaleableReturn'`, `'dscsaSuspectIllegitimate'`, `'dscsaExceptionVerification'` or `'dscsaStatusCheck'`.

[8] OpenAPI Specification and OAS and their respective logos, are trademarks of The Linux Foundation®. Linux is a registered trademark of Linus Torvalds.


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**Figure 5-1** Two API `paths` defined in the global paths section of the API specification

## 5.2 Operations

In OpenAPI Specification terms, operations are HTTP methods used to access and manipulate the `paths`. For each `path`, one or more operations such as `GET`, `POST`, or `DELETE` can be defined, but only one instance of an operation (HTTP method) can be defined for a `path`.

Both the `checkConnectivity` and `verify` paths of a verification service are defined to have a single operation: `GET`.


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**Figure 5-2** HTTP `GET` method defined for the two API paths, `/checkConnectivity` and `/verify`


```
{
  "openapi": "3.0.0",
  "info": {
    "version": "1.0.0",
    "title": "GS1 Verification Messaging Standard",
    "contact": {
      "name": "GS1",
      "url": "https://www.gs1.org",
      "email": "gsmp@gs1.org"
    },
    "description": "This the API specification for peer-to-peer communication between Verification Router Servi
    "x-GS1US-version": {
        "x-GS1US-description": "GS1US Version 1.3.1 incorporating changes needed to meet requirements of the Dr
        "x-GS1US-versionNumber": "1.3.1"
    }
  },
  "servers": [
    {
      "url": "https://vrs.example.com/gateway/placeholder"
    }
  ],
  "paths": {
    "/checkConnectivity": {
      "get": {…
      }
    },
    "/verify/gtin/{gtin}/lot/{lot}/ser/{ser}": {
      "get": {…
      }
```


## 5.3 Parameters

In OpenAPI Specification, `parameters` are defined in the parameters section of an operation or `path`. A parameter description includes the following:

- `Parameter` name.
- Location of where the `parameter` appears (i.e., whether it is included in the path (`in: path`), the query string (`in: query`) or the HTTP header (in: header).
- Data type of the `parameter` as defined by either schema or content.
- Other `parameter` attributes (such as parameter description) and whether the `parameter` is required or optional.

`Path, query, and header` are three types of parameters defined in the OpenAPI Specification:

- `Path` parameters form the variable part of a URI path, and they partition the resource of the path. The location of `path` parameters is denoted by `in: path` in the `parameter` section of the OpenAPI Specification.


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**Figure 5-3** The three `path` parameters that partition the resources of the `/verify` path to a specific `gtin, lot` and `ser`


```
"paths": {
  "/checkConnectivity": {···
  },
  "/verify/gtin/{gtin}/lot/{lot}/ser/{ser}": {
    "get": {
      "tags": [···
      ],
      "description": "Verification of a product identifier",
      "parameters": [
        {
          "name": "gtin",
          "in": "path",
          "description": "Global Trade Item Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/gtin"
          }
        },
        {
          "name": "lot",
          "in": "path",
          "description": "Lot/Batch Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/lotNum"
          }
        },
        {
          "name": "ser",
          "in": "path",
          "description": "Serial Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/serialNumber"
          }
        },
```


`Query` parameters appear at the end of the request URL after a question mark ('?') followed by name value pair (`name=value`) separated by ampersands ('&'). The location of `query` parameters is denoted by the `in: query` in the `parameter` section of the OpenAPI Specification. When there is no value specified for an optional query parameter, omit the optional query parameter in the URI query string.

`Header` parameters appear in the header of an HTTP request or HTTP response message. Header parameters are used to define user-defined custom HTTP headers in an HTTP request or HTTP response. The location of `header` parameters is denoted by the `in: header` in the `parameter` section of the OpenAPI Specification.

Here is an example taken from Figure 1-5 of the *GS1 Lightweight Verification Messaging Standard* illustrating a `/verify` path with query parameters `exp, linkType, context, reqGLN, corrUUID, ctrlPossessAtt, email, and telephone`:

GET *https://verificationService.example.com/*verify/gtin/{gtin}/lot/{lot}/ser/{ser}?exp={exp}&linkType=verificationService&context=dscsaSaleableReturn&reqGLN={reqGLN}&corrUUID={correlationUUID}&ctrlPossessAtt={control or possession attestation}&email={email}&telephone={telephone}

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**Note**: Either email or telephone MUST be provided even though the schema has them as optional fields.

**Note**: It is recommended for US-based telephone numbers that the value be represented in the hyphenated standard 11-digit format and for an international telephone number, prepend with the appropriate international direct dial codes (IDD Code) (See WorldData.info or CountryCode.org for IDD codes). GS1 recommends only using numeric characters and unreserved characters such as a hyphen (-) when constructing a phone number in the parameters of a GS1 Digital Link URI (See Appendix 11.2 for unreserved and reserved characters listing). Should you choose to use a reserved character such as a plus sign (+) be aware that you will need to use percent encoding. Percent encoding is a three-character string comprised of a percent sign (%) as an escape character followed by its two-character hexadecimal representation. For example, a plus sign (+) would be represented as %2B in the URI string. When adding phone extensions, use the abbreviation of EXT and then follow with the appropriate telephone number format. There is a maximum of 30 characters in length for this field.

**Figure 5-4** How the `query` parameters are defined for /verify in the GS1 Lightweight Verification Messaging Standard

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```
      "name": "context",
      "in": "query",
      "description": "Verification Context",
      "required": true,
      "schema": {
        "$ref": "#/components/schemas/context"
      }
    },
    {
      "name": "reqGLN",
      "in": "query",
      "description": "Requestor GLN",
      "required": true,
      "schema": {
        "$ref": "#/components/schemas/gln"
      }
    },
    {
      "name": "corrUUID",
      "in": "query",
      "description": "Correlation UUID",
      "required": true,
      "schema": {
        "$ref": "#/components/schemas/uuid"
      }
    },
    {
      "name": "ctrlPossessAtt",
      "in": "query",
      "description": "Attestation of Control",
      "required": true,
      "schema": {
        "$ref": "#/components/schemas/ctrlPossessAtt"
      }
    },
      "name": "email",
      "in": "query",
      "description": "email address of requestor",
      "required": false,
      "schema": {
        "$ref": "#/components/schemas/email"
      }
    },
    {
      "name": "telephone",
      "in": "query",
      "description": "Telephone number of requestor",
      "required": false,
      "schema": {
        "$ref": "#/components/schemas/telephone"
      }
    },
```



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Parameter definitions include `schema` objects to describe the structure and syntax of the parameters. Schema definitions facilitate robust validation and implementations of the API. Implementations of the verification messaging service for product identifiers will be validated against the schemas defined in the *GS1 Lightweight Verification Messaging Standard*.

**Figure 5-5** shows the **gln** `schema` definition which specifies data type, minimum length, maximum length, regular expression template for the string value and provides an example. This **gln** `schema` definition is one of many `schema` definitions included in the components section of the *GS1 Lightweight Verification Messaging Standard*.

**Figure 5-5** GLN `schema` definition

```
"schemas": {
  "gln": {
    "type": "string",
    "minLength": 13,
    "maxLength": 13,
    "example": "9071404000002",
    "pattern": "^\\d{13}$"
  },
```

## 5.4 Components and Schema Data

Schema definitions shared by multiple parameters and response properties are defined in the `components` section of the OpenAPI Specification and referenced in the schema parameter definition using **$ref**. This consolidates the shared and reusable definitions in one section of the OpenAPI Specification.


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**Figure 5-6** GLN `schema` being referenced in the parameter definition of `reqGLN` for `/verify`

```
"paths": {
  "/checkConnectivity": {···
  },
  "/verify/gtin/{gtin}/lot/{lot}/ser/{ser}": {
    "get": {
      "tags": [···
      ],
      "description": "Verification of a product identifier",
      "parameters": [
        {
          "name": "gtin",
          "in": "path",
          "description": "Global Trade Item Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/gtin"
          }
        },
        {···
        },
        {···
        },
        {···
        },
        {···
        },
        {···
        },
        {
          "name": "reqGLN",
          "in": "query",
          "description": "Requestor GLN",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/gln"
          }
        },
```


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**Figure 5-7** GLN `schema` being referenced by the `responderGLN` properties in the `ConnectivityCheckResponse`

**Figure 5-8** GLN `schema` being referenced by the `responderGLN` properties in the `PositiveVerificationResponse`

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**Figure 5-9** GLN `schema` being referenced by the `responderGLN` properties in the `NegativeVerificationResponse`

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**Figure 5-10** Common `schema` and response structures shared by multiple API operations


```
"components": {
  "schemas": {
    "gln": {…
    },
    "gtin": {…
    },
    "lotNum": {…
    },
    "serialNumber": {…
    },
    "expiryDate": {…
    },
    "uuid": {…
    },
    "timestamp": {…
    },
    "linkType": {…
    },
    "context": {…
    },
    "ctrlPossessAtt": {…
    },
    "email": {…
    },
    "telephone": {…
    },
    "GS1US-Version": {…
    },
    "ATP-Authorization": {…
    },
    "positiveVerificationStatus": {…
    },
    "negativeVerificationStatus": {…
    },
    "verificationFailureReason": {…
    },
    "additionalInformation": {…
    },
    "ConnectivityCheckResponse": {…
    },
    "PositiveVerificationResponse": {…
    },
    "NegativeVerificationResponse": {…
    }
  }
}
```



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## 5.5 Responses

An API specification defines the structure of the response for each of the operations in the API. The response includes the HTTP status code(s) and the content of the data returned in the response body. The *GS1 Lightweight Verification Messaging Standard* defines a `ConnectivityCheckReponse` to a successful response to the `/checkConnectivity GET` operation.

**Figure 5-11** Response definition for `/checkConnectivity GET` operation


```
"paths": {
  "/checkConnectivity": {
    "get": {
      "tags": [ ···
      ],
      "description": "Test connection to endpoints",
      "parameters": [ ···
      ],
      "responses": {
        "200": {
          "headers": {
            "GS1US-Version": {
              "description": "The GS1US version of the LVMS. Should equal the version number listed in the info/x-GS1US-v
              "required": true,
              "schema": {
                "$ref": "#/components/schemas/GS1US-Version"
              }
            },
            "ATP-Authorization": {
              "description": "The ATP credential to be passed in the HTTP header",
              "required": false,
              "schema": {
                "$ref": "#/components/schemas/ATP-Authorization"
              }
            }
          },
          "description": "A response code of 200 means the request was successful and details about the response can be f
          "content": {
            "application/json": {
              "schema": {
                "$ref": "#/components/schemas/ConnectivityCheckResponse"
              }
            }
          }
        },
        "400": { ···
        },
        "401": { ···
        },
        "403": { ···
        },
```



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For the `/verify GET` operation, a successful response can either be based on `PositiveVerificationResponse` or a `NegativeVerificationResponse`.

**Figure 5-12** Response definition for the `/verify GET` operation


```
"/verify/gtin/{gtin}/lot/{lot}/ser/{ser}": {
  "get": {
    "tags": [ ···
    ],
    "description": "Verification of a product identifier",
    "parameters": [ ···
    ],
    "responses": {
      "200": {
        "headers": {
          "GS1US-Version": {
            "description": "The GS1US version of the LVMS. Should equal the version number listed in the info/x-GS1US-version/
            "required": true,
            "schema": {
              "$ref": "#/components/schemas/GS1US-Version"
            }
          },
          "ATP-Authorization": {
            "description": "The ATP credential to be passed in the HTTP header",
            "required": false,
            "schema": {
              "$ref": "#/components/schemas/ATP-Authorization"
            }
          }
        },
        "description": "A response code of 200 means the request was successful and details about the response can be found ir
        "content": {
          "application/json": {
            "schema": {
              "oneOf": [
                {
                  "$ref": "#/components/schemas/PositiveVerificationResponse"
                },
                {
                  "$ref": "#/components/schemas/NegativeVerificationResponse"
                }
              ]
            }
          }
        }
      },
      "400": { ···
      },
      "401": { ···
      },
      "403": { ···
      },
```


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# 6 Configuration and Set-up for Connectivity Testing

## 6.1 Making a Connectivity Request

Prior to performing a verification request, users can perform a connectivity check to confirm that a web connection to the corresponding verification service exists, and that the verification service is online and responding. Connectivity check is purely a system function that can be performed occasionally to assure web connections are still valid and active.

The `checkConnectivity` operation of a verification service enables a check for connectivity with the verification service that returns appropriate HTTP status codes. If the Requestor GLN (`reqGLN`) was not recognized, the verification service can respond with an `HTTP 401 'Unauthorized'` response, provided that it receives the request. If the Requestor GLN (`reqGLN`) is not permitted to make requests or the ATP Verifiable Credential is expired, revoked, or contains an invalid signature, the verification service can respond with an `HTTP 403 'Forbidden'` response.

Since the verification service provider for a GTIN may change due to changes in product ownership, such as product divestiture or company merger and acquisition (M&A), or due to solution change in serial number repository or VRS provider, the look-up directory may contain multiple verification service links for the same GTIN. The look-up directory entries for the same GTIN are differentiated in the look-up directory by non-overlapping startExpDate and endExpDate. For the purpose of checking system availability of verification service for a GTIN, a connectivity request can be made to each verification service link matching a GTIN.

The `checkConnectivity` operation of a verification service is a simple `HTTPS GET` request wherein the URI path information ends with `/checkConnectivity` and the following four required query parameters are specified in the URI query string:

- GTIN (for routing purposes)
- Requestor GLN (to uniquely identify the Requestor)
- Link Type (indicates specific type of information or service)
- Context (indicates the specific scope of service within the verification service)

## 6.2 Example of a JSON connectivity test

The example below illustrates a sample JSON connectivity test with a known verification service with the context of verification of `dscsaSaleableReturn`. The HTTP header `Accept:` with value `application/json` is used to indicate to the verification service that the client would like to receive a response to the connectivity check in JavaScript Object Notation (JSON) format.

```
GET
https://verificationService.example.com/checkConnectivity?gtin=01234567890128&reqGLN=0321012345676&linkType=verificationService&context=dscsaSaleableReturn
Accept: application/json
GS1US-Version: 1.3.1
```

When ATP verifiable credential is used, there is the addition of an ATP-Authorization header field in a JSON connectivity test with a known verification service given the context of verification of `dscsaSaleableReturn`. HTTP header `ATP-Authorization: with the Requestor Credential in JSON Web Token (JWT) format enables verification service to perform authorization checks.`

```
For example:
GET
```

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```
https://verificationService.example.com/checkConnectivity?gtin=01234567890128&r
eqGLN=0321012345676&linkType=verificationService&context=dscsaSaleableReturn
Accept: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJraWQiOiIwOXdoVHNEM1JR…
```

## 6.3 Example of a successful JSON connectivity response

The response to such a connectivity check request is an HTTP response containing a JSON body payload formatted as follows:

```
{
"responderGLN":"{responderGLN}"
}
```

If the responder GLN were 012341234567, the following JSON body would be expected in the response if the connection is successful and returns an `HTTP 200 status code`:

```
{
"responderGLN":"012341234567"
}
```

## 6.4 Example of a successful JSON connectivity response with HTTP status code 200

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"responderGLN":"012341234567"
}
```

```
Below is a corresponding example of a successful JSON connectivity response
which includes an ATP Credential in JWT format with HTTP status code 200.
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJraWQiOiIwOXdoVHNEM1JR…
{
"responderGLN":"012341234567"
}
```

## 6.5 Example of a failed JSON connectivity response with an HTTP status code of 503

If no successful connection can be established, appropriate HTTP status codes and helpful descriptions will be returned.

```
HTTP 1.1 503 Service Unavailable.  System is undergoing maintenance or is
otherwise temporarily unavailable for API queries.
```


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```
Cache-Control: private, no-cache
Content-Type: application/json
```

## 6.6 Example of a failed JSON connectivity response with an HTTP status code of 403

When the provided ATP credential is expired, revoked, or contains an invalid signature, the connectivity request will fail and return an HTTP status code of 403.

```
HTTP 1.1 403 Forbidden. The server is refusing to provide a response because
the Requestor lacks permission due to a credential that is expired, revoked, or
contains an invalid signature.
Cache-Control: private, no-cache
Content-Type: application/json
```


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# 7 Configuration and Set-up for a DSCSA Verification Request

## 7.1 Making a DSCSA Verification Request

Using the GS1 Lightweight Messaging Standard, an `HTTPS GET` request can be made to request verification of a DSCSA product identifier on a given product by specifying `linkType=verificationService` and by specifying the verification `context=dscsaSaleableReturn or dscsaSuspectIllegitimate or dscsaExceptionVerification or dscsaStatusCheck` , as well as the following details of the request supplied via the URI query string:

- Requestor GLN (to uniquely identify the Requestor).
- Correlation UUID (universally unique identifier, uniquely generated by the Requestor).
- Control or Possession Attestation (a boolean indicating the requestor's attestation that they have possession or control of the product).
- Email or Telephone (of the contact point responsible for verification request).

Although a Web request typically returns a synchronous response, both the request and corresponding response may also be archived for audit purposes. It is for this reason that both share the same Correlation UUID, in order that each request may be matched with the corresponding response even when archived.

The Requestor GLN may be used by a verification service as an input to an access control decision, where access may only be granted to recognized values of Requestor GLN, and requests with unrecognized values of Requestor GLN may be redirected to a registration page (via an `HTTP 403 'Forbidden' response`) through which the Requestor can register for access by providing appropriate credentials and justification.

When ATP verifiable credential is utilized to prove authorized trading partner status, the ATP Credential in JWT format provided in the ATP-Authorization header field of the verification request message will serve as input to the access control decision logic performed by the verification service to grant access only to valid ATP Credential holders and reject access to requestors with ATP credential that is expired, revoked, or contains an invalid signature.

The full GS1 Digital Link Web URI template for a verification request for a DSCSA product identifier on a product is therefore generated by adding the following additional query parameters to the URI query string:

```
&linkType=verificationService
&context=dscsaSaleableReturn
&reqGLN={RequestorGLN}
&corrUUID={CorrelationUUID}
&ctrlPossessAtt={true or false}
&email={email}
&telephone={telephone}
```

This results in the following URI template:

```
https://other.example.com/gtin/{gtin}/lot/{lot}/ser/{ser}?exp={exp}&linkType=verificationService&context=dscsaSaleableReturn&reqGLN={RequestorGLN}&corrUUID={CorrelationUUID}&ctrlPossessAtt={true or false}&email={email}&telephone={telephone}
```


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A resolver for GS1 Digital Link URI could be configured to redirect a GS1 Digital Link URI with these additional parameters in the query string (and the absence of the `checkConnectivity=true` parameter) to the verify method/operation of the appropriate verification service specified by the respective brand owner and licensee of that GTIN.

**Note**: Some of these parameters (e.g., Requestor GLN, Correlation UUID, Control or Possession Attestation, and email or telephone) are explicitly required by the context associated with DSCSA but may not be relevant to other uses of the GS1 Lightweight Messaging Standard in other sectors or regulatory jurisdictions.

**Note**: Additional query parameters in the verification requests beyond the query parameters defined in this implementation guideline are permissible but should be ignored since they are not part of the interoperable exchange. Please be sure to consult the specific GS1US-Version attribute in the header of the verification request and response message for the industry expected request and response message structure.

**Note**: For PI Verification Request, for optional properties, omit the optional query parameter where no value is specified in the URI query string. HTTP status code 400 will be returned when either telephone or email is included in the query string with a null value.

## 7.2 Example of a JSON verification request

The examples below use the following values for GTIN, Batch or Lot Number, Serial Number and Expiration Date, Requestor GLN, Correlation UUID and context:

- **GTIN:** 00361414567894
- **Batch or Lot Number:** 1908642E
- **Serial Number:** 400806
- **Expiration Date:** 230728
- **linkType:** verificationService
- **context:** dscsaSaleableReturn
- **Requestor GLN:** 0321012345676
- **Correlation UUID:** 21EC2020-3AEA-4069-A2DD-08002B30309D
- **Attestation of Control/Possession:** true
- **Email:** anyone@anynet.com
- **Telephone:** 1-937-435-3870

Inputting these values into the full GS1 Digital Link Web URI template shown above produces the following URI:

https://other.example.com/gtin/00361414567894/lot/1908642E/ser/400806?exp=230728&linkType=verificationService&context=dscsaSaleableReturn&reqGLN=0321012345676&corrUUID=21EC2020-3AEA-4069-A2DD-08002B30309D&ctrlpossessAtt=true&email=anyone@anynet.com&telephone=1-937-435-3870

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**Note**: For Telephone, included are examples for demonstrative purposes and does NOT represent an EXHAUSTIVE list of how a telephone number can be expressed. GS1 recommends only using numeric characters and unreserved characters such as a hyphen (-) when constructing a phone number in the parameters of a GS1 Digital Link URI (See Appendix 11.2 for unreserved and reserved characters listing).

By making a simple `HTTPS GET` request for such Web URIs, the Requestor would be redirected to the respective brand owner's verification service (provided this is known to a resolver for GS1 Digital Link Web URIs), which could then use the translation functions to extract the data, convert it to a searchable format, and then process the verification request by searching their systems and issuing an appropriate response.

The example below illustrates a sample JSON verification request with the `context` of `dscsaSaleableReturn` when communicating with a known verification service. The HTTP header `Accept:` with value application/`json` is used to indicate to the verification service that the client would like to receive a response to the verification request in JavaScript Object Notation (JSON) format. The optional HTTP header `ATP-Authorization:` with the ATP Requestor credential in JWT format can be provided to enable ATP Requestor verifiable credential checks.

```
GET
https://verificationService.example.com/verify/gtin/01234567890128/lot/1908642E/ser/400806?exp=230728&linkType=verificationService&context=dscsaSaleableReturn&reqGLN=0321012345678&corrUUID=21EC2020-3AEA-4069-A2DD-08002B30309D&ctrlpossessAtt=true&email=anyone@anynet.com&telephone=1-937-435-3870
Accept: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJraWQiOiIwOXdoVHNEM1JR…
```


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# 8 Verification Responses

## 8.1 Interpretation of the 'verified' field

DSCSA requires parties engaged in the commercial pharmaceutical supply chain distribution to verify the product identifier of suspect product investigations, illegitimate product investigations, and returned products before these products can be placed into inventory for resale, further distribution or dispensing .[9] The response message and this guideline were designed to respond to various verification scenarios.

Following DSCSA's definition (See Scope), the "verified" field in the Output Response message is used to indicate whether a product identifier submitted in the request matches a product identifier affixed or imprinted by the manufacturer or repackager (i.e., true) or not (i.e., false).

**Important**: **The "verified" field in the Output Response message does not, and should not, be interpreted as indicating whether a returned product can, or should, be placed into inventory for resale, further distribution, or dispensing.**

The ultimate decision as to whether a product being verified can be placed back in inventory for resale, further distribution, or dispensing may be subject to, and/or dependent on, additional regulatory/statutory requirements and/or business considerations. These requirements and considerations are beyond the scope of the Output Response message and this guideline. Although the Output Response message includes fields for "Reason for Failure" and "Additional Info" to enable manufacturers or repackagers to communicate additional information in the message, it is assumed trading partners will continue to use whatever communication approaches they deem appropriate for those other regulatory, statutory, or business needs.

**Note**: The verification response should be based on information associated with the product identifier and not dependent on the requested context value. Therefore, the verification response will not vary based on requested context value.

## 8.2 Syntax of Verification Response

- JSON syntax will be used to respond to all verification requests.
- Verification Responses SHALL, at a minimum, indicate:
  - Responder GLN
  - Correlation UUID indicated by the Requestor in the original Verification Request
  - Email or Telephone of the contact point responsible for Verification Response
  - Whether the product identifier was verified (true) or not verified (false)
  - Where NOT verified, indication of the reason for non-verification via the value of the `verificationFailureReason` parameter using one of the following code values:

**Note**: For PI Verification Response, omit optional properties in the response if the value is unknown, rather than including them and expressing a null value.

[9] Drug Supply Chain Security Act, Section 582(c)(4)(D). Pub. Law No. 113-54, 127 Stat 587, 613 (2013). Retrieved November 3, 2018 from: *https://www.gpo.gov/fdsys/pkg/PLAW-113publ54/html/PLAW-113publ54.htm*

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| Code value for `verificationFailureReason` | Meaning |
|---|---|
| `"Manufacturer_policy"` | Pharmaceutical manufacturers may have different internal policies, which will return a Verified true or false, for the same conditions or determines whether to return additional information with the verification. |
| `"No_match_GTIN_Serial"` | No match between GTIN and Serial Number<br>*(For a serialized product, if GTIN and Serial Number do not match, there is no need to check whether Lot or Expiration Date match)* |
| `"No_match_GTIN_Serial_Lot_Expiry"` | No match between (GTIN and Serial Number) and Lot Number and Expiration Date |
| `"No_match_GTIN_Serial_Lot"` | No match between (GTIN and Serial Number) and Lot Number |
| `"No_match_GTIN_Serial_Expiry"` | No match between (GTIN and Serial Number) and Expiration Date |
| `"No_reason_provided"` | No reason provided |
| `"Not_for_re-distribution"` | The pharmaceutical manufacturer notifies the Requestor that the product is Suspect and Not for re-distribution |

- To enhance auditability, a verification timestamp is included in the verification response to record the date and time the manufacturer responded to the verification request.
- OPTIONAL additional information may be provided via the `additionalInfo` parameter.
  - The value of the `additionalInfo` parameter is not a free text description, but rather a code value from the following table:

| Code value for `additionalInfo` | Meaning |
|---|---|
| `"Expired"` | The product has an expiration date which is in the past. |
| `"ExpirationExtended"` | The expiration date has been extended by the FDA for the product being verified. |
| `"Recalled"` | The product has been recalled or withdrawn. |
| `"Suspect"` | The product's authenticity or integrity is considered suspect by the Responder. |
| `"Illegitimate"` | The product's authenticity or integrity is considered illegitimate by the Responder. |

- To enhance ATP status checking, the Responder ATP Credential in JWT format may be included in the ATP-Authorization header field of the verification response message.

## 8.3 Examples of verification responses based on U.S. supply chain business scenarios

Each example business scenario presented in this chapter starts with the "Requestor" entering the DSCSA product identifier marked on a serialized product (e.g., scan the barcode; key in; interface;


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etc.), and then requesting verification of the product identifier. VRS then routes the request to the appropriate manufacturer (herein referred to as "Responder") for verification of the product identifier against their repository.

**Note:** Manufacturer is referenced in this section and the following as the "Responder", but this could also represent a Repackager.

**Example** Response Scenarios

| | **Logic inside VRS solution provider's software** | **In VRS provider's Verification Conditions** | | **Messaging Standard - Output Response** | | |
|---|---|---|---|---|---|---|
| Scenario Number | Scenario Description | PI match | Info exists to indicate product is **UNFIT for distribution** | **Verified** | **verificationFailure Reason** | **additionalInfo** |
| Scenario A1 | Product Identifier matches AND Manufacturer has NO information to indicate that product is UNFIT for distribution | **Yes** | **No** | **True** | | |
| Scenario A2 | Product Identifier matches AND Manufacturer has NO information to indicate that product is UNFIT for distribution and has PROVIDED additional info, indicating the product has extended expiration. | **Yes** | **No** | **True** | | ExpirationExtended |
| Scenario B1 | Product Identifier matches, AND Manufacturer has PROVIDED additional info based on messaging priority, indicating the product is Recalled or Expired and therefore UNFIT for distribution | **Yes** | **Yes** | **True*** based on manufacturer internal policy | | Either Recalled or Expired |
| Scenario B2 | Product Identifier matches, AND Manufacturer has PROVIDED additional info based on messaging priority, indicating that the product is Recalled or Expired and therefore UNFIT for distribution | **Yes** | **Yes** | **False*** based on manufacturer internal policy | Manufacturer_policy | Either Recalled or Expired |
| Scenario C1 | Product Identifier matches, AND Manufacturer has PROVIDED additional info based on messaging priority, indicating that product is Suspect or Illegitimate and therefore UNFIT for distribution | **Yes** | **Yes** | **False*** based on manufacturer internal policy | Not _for_re-distribution | Either Suspect or Illegitimate |
| Scenario C2 | Product Identifier matches, AND Manufacturer HAS info to suggest that product is UNFIT for distribution and Manufacturer chooses NOT to provide additional info. | **Yes** | **Yes** | **False*** based on manufacturer internal policy | Manufacturer_policy | |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Scenario D | Product Identifier does NOT match AND Manufacturer chooses NOT to provide a reason for verification failure | **No** | | **False** | No_reason_provided | |
| Scenario E | Product identifier does NOT match, AND Manufacturer provides a specific reason for verification failure | **No** | | **False** | **One of the following can be provided:** No_match_GTIN_Serial No_match_GTIN_Serial_Lot_Expiry No_match_GTIN_Serial_Lot No_match_GTIN_Serial_Expiry | |

***** Pharmaceutical manufacturers may have different internal policies, which will return a Verified True, or False for the same conditions. Internal policies will also allow manufacturers to leave additionalInfo field blank.

**Example** Messaging Priority

When both Product Identifier status conditions exist, the Messaging Priority table defines which of the status condition will be included in additionalInfo. For example, if a product identifier is both recalled and expired, the recalled status takes precedence over expired and therefore, additionalInfo will only show Recalled.

| Priority 1 | Priority 2 |
|---|---|
| "Recalled" | "Expired" |
| "Illegitimate" | "Suspect" |

## 8.4 Scenario A1

In Scenario A1, the Product Identifier matches a value in the Responder's repository. No Information exists to indicate the Product is Unfit for Distribution and the Output Response of Verified = true is provided back to the Requestor.


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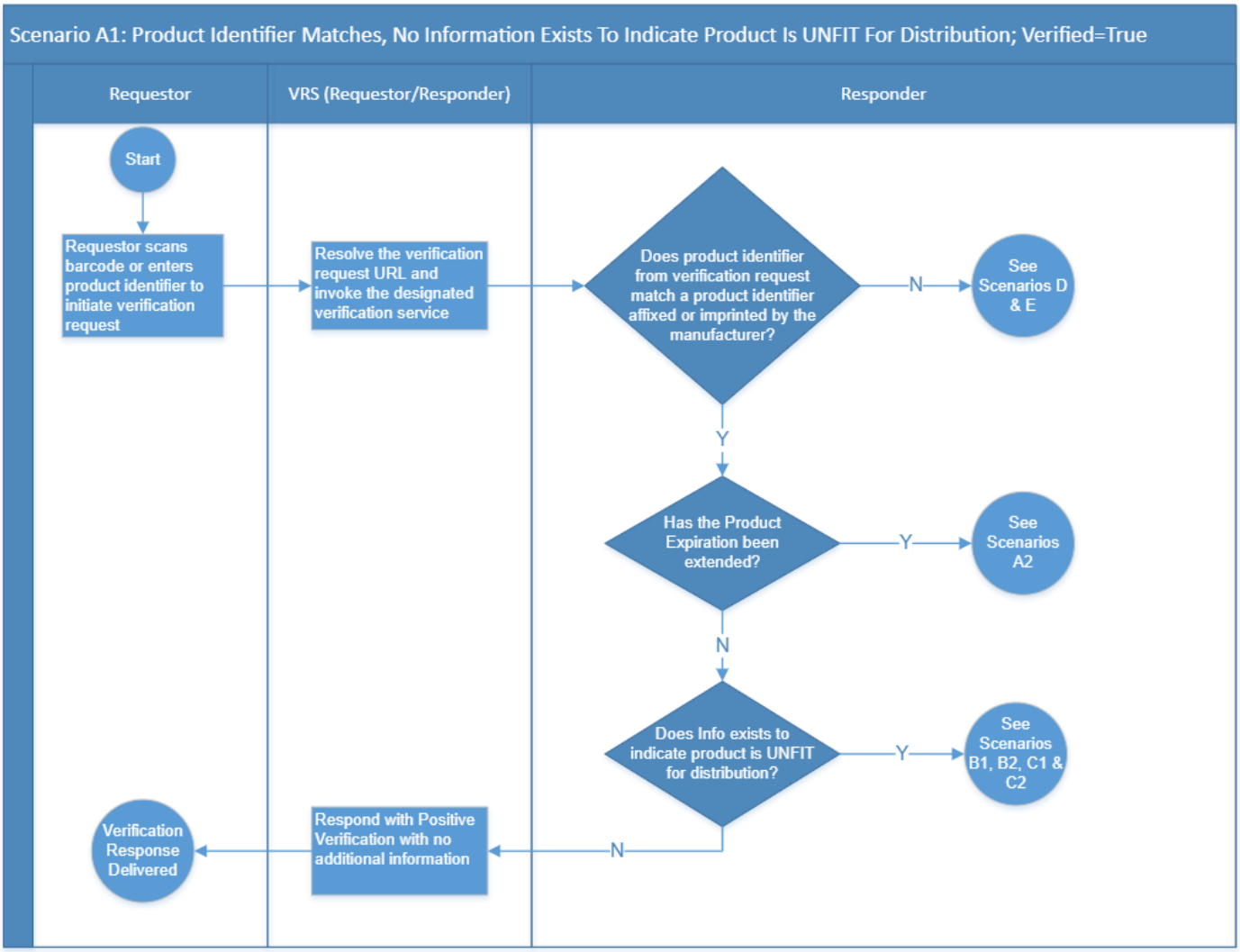


The example below illustrates a sample JSON response to a request for verification of a product identifier following positive verification, with no additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},

"data" : {
```

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```
"verified": true
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a returned product identifier following positive verification, with no additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676` and the Responder's email contact is `someone@somenet.com`. Since the Responder's telephone contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": true
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.5 Scenario A2

In Scenario A2, the Product Identifier matches a value in the Responder's repository. No Information exists to indicate the Product is Unfit for Distribution and the Output Response of Verified = true is provided back to the Requestor. Additional information is provided, indicating the product expiration date has been extended.


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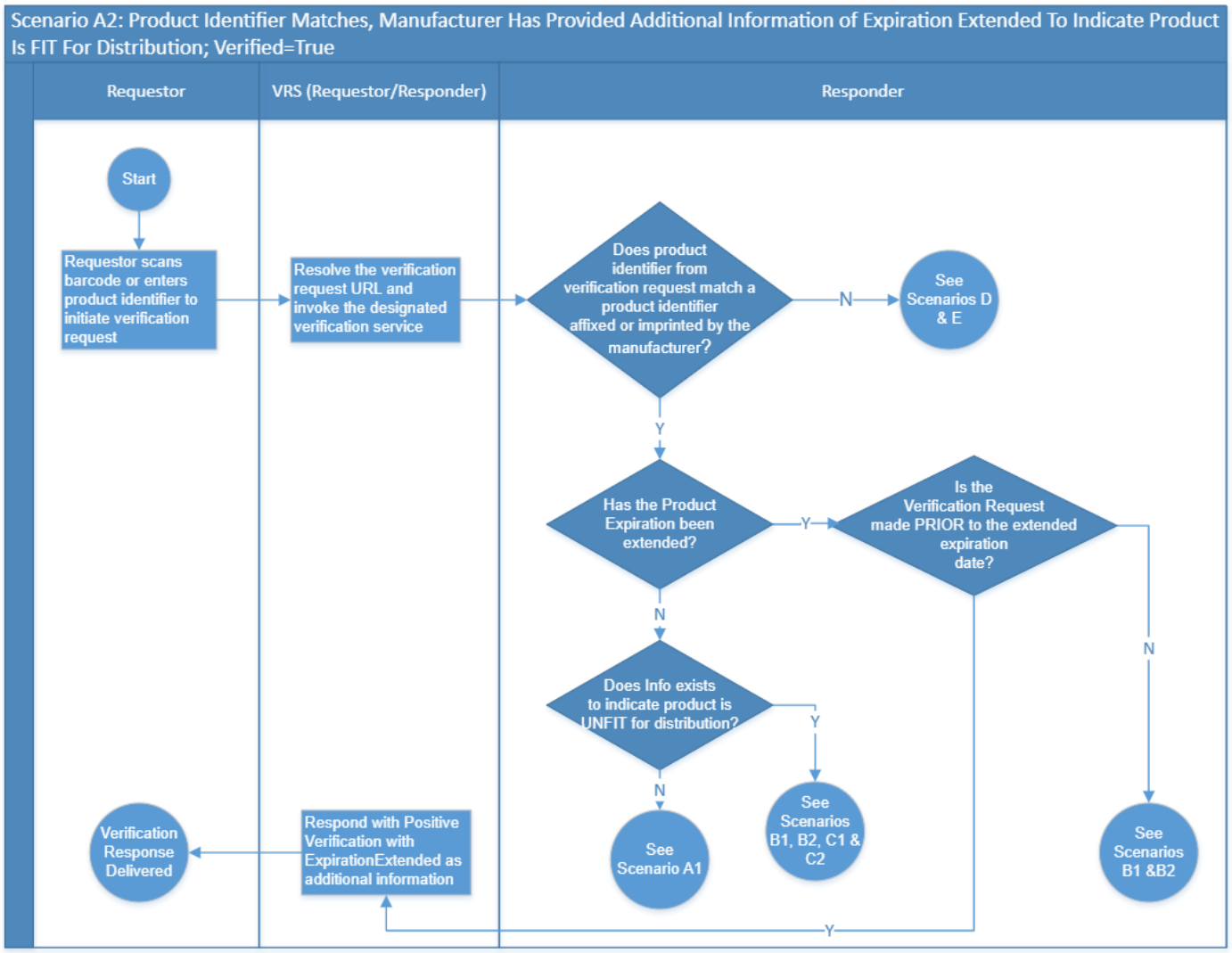


The example below illustrates a sample JSON response to a request for verification of a product identifier following positive verification, with "ExpirationExtended" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},

"data" : {
```

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```
"verified": true,
"additionalInfo": "ExpirationExtended"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a returned product identifier following positive verification, with "ExpirationExtended" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676 and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": true,
"additionalInfo": "ExpirationExtended"

},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.6 Scenario B1

In Scenario B1, the Product Identifier matches a value in the Responder's repository, and the Responder has reason to believe that the product is recalled/withdrawn or expired. The Responder returns a true verification response (based on the manufacturer internal policy) and provides "Recalled" or "Expired" as additional information in the Output Response.


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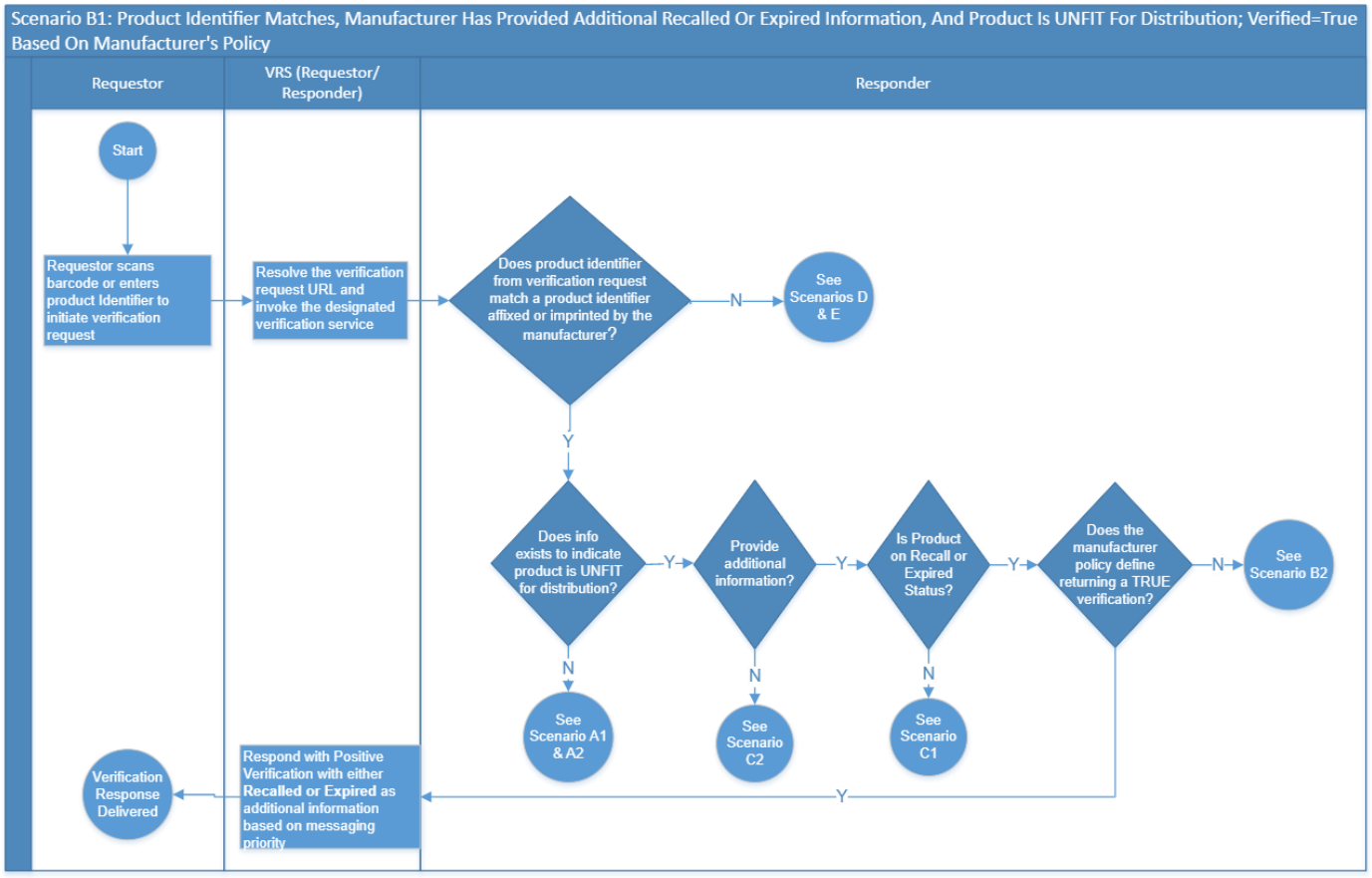


The example below illustrates a sample JSON response to a request for verification of a product identifier following a positive verification response, which includes "`Recalled`" as additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's telephone contact is `001-937-435-3870`. Since the Responder's email contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "001-937-435-3870"
},
"data" : {
"verified": true,
"additionalInfo": "Recalled"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```


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The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following a positive verification response, which includes "Recalled" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 001-937-435-3870. Since the Responder's email contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "001-937-435-3870"
},
"data" : {
"verified": true,
"additionalInfo": "Recalled"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below illustrates a sample JSON response to a request for verification of a product identifier following a positive verification, which includes "Expired" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 001-937-435-3870. Since the Responder's email contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "001-937-435-3870"
},
"data" : {
"verified": true,
"additionalInfo": "Expired"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following a positive verification, which includes "Expired" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 001-937-435-3870. Since the


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Responder's email contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "001-937-435-3870"
},
"data" : {
"verified": true,
"additionalInfo": "Expired"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.7 Scenario B2

In Scenario B2, the Product Identifier matches a value in the Responder's repository, and the Responder has reason to believe that the product is recalled/withdrawn or expired. The Responder returns a false verification response (based on the manufacturer internal policy) and provides "Recalled" or "Expired" as additional information in the Output Response.


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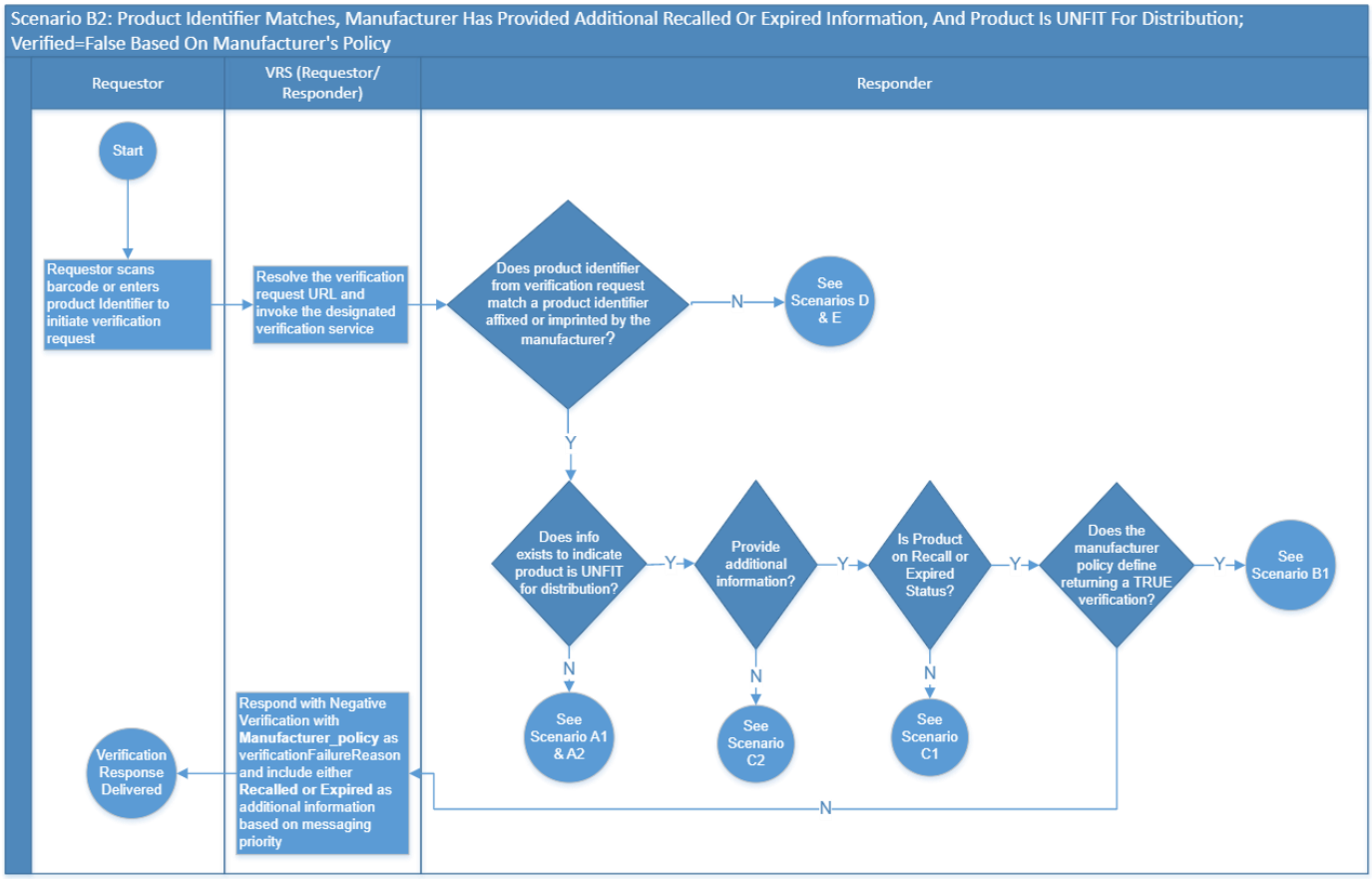


The example below illustrates a sample JSON response to a request for verification of a product identifier following failure of verification, which includes "`Recalled`" as additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy",
"additionalInfo": "Recalled"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
```


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```
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following failure of verification, which includes "Recalled" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy",
"additionalInfo": "Recalled"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below illustrates a sample JSON response to a request for verification of a product identifier following failure of verification, which includes "Expired" as additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy",
"additionalInfo": "Expired"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following failure of verification, which includes "Expired" as

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additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's email contact is `someone@somenet.com`. Since the Responder's telephone contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy",
"additionalInfo": "Expired"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.8 Scenario C1

In Scenario C1, the product Identifier matches a value in the Responder's repository, and the Responder has reason to believe that the product is either suspect or illegitimate. The Responder returns a false verification response and provides "`Not_for_re-distribution`" as a reason for the verification failure with either "Suspect" or "Illegitimate" as additional information.


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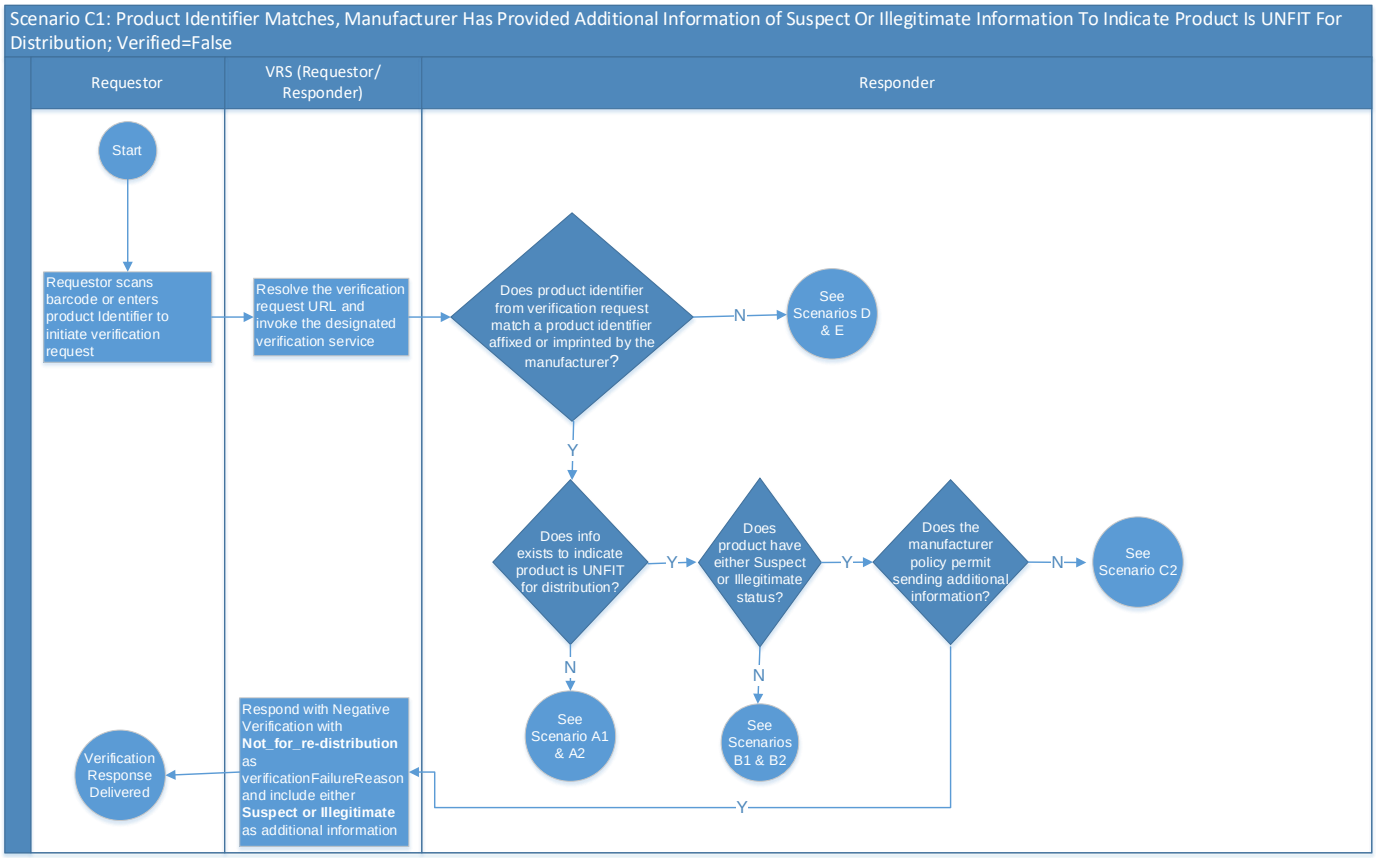


The example below illustrates a sample JSON response to a request for verification of a product identifier following negative verification, with "`Not_for_re-distribution`" as reason for failure and additionalInfo of "`Suspect`". In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's telephone contact is `1-937-435-3870 EXT123`. Since the Responder's email contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "1-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "Not_for_re-distribution",
"additionalInfo": "Suspect"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```


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The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following negative verification, with "Not_for_re-distribution" as reason for failure and additionalInfo of "Suspect". In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 1-937-435-3870 EXT123. Since the Responder's email contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "1-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "Not_for_re-distribution",
"additionalInfo": "Suspect"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below illustrates a sample JSON response to a request for verification of a product identifier following negative verification, with "Not_for_re-distribution" as reason for failure and additionalInfo of "Illegitimate". In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 1-937-435-3870 EXT123. Since the Responder's email contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "1-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "Not_for_re-distribution",
"additionalInfo": "Illegitimate"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```


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The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following negative verification, with "Not_for_re-distribution" as reason for failure and additionalInfo of "Illegitimate". In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's telephone contact is 1-937-435-3870 EXT123. Since the Responder's email contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"telephone": "1-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "Not_for_re-distribution",
"additionalInfo": "Illegitimate"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.9 Scenario C2

In Scenario C2, the Product Identifier matches a value in the Responder's repository, and the Responder has reason to believe that the product is unfit for distribution. Based on the manufacturer's policy, the Responder returns a false verification response and provides "Manufacturer_policy" as a reason for the verification failure without additional information.


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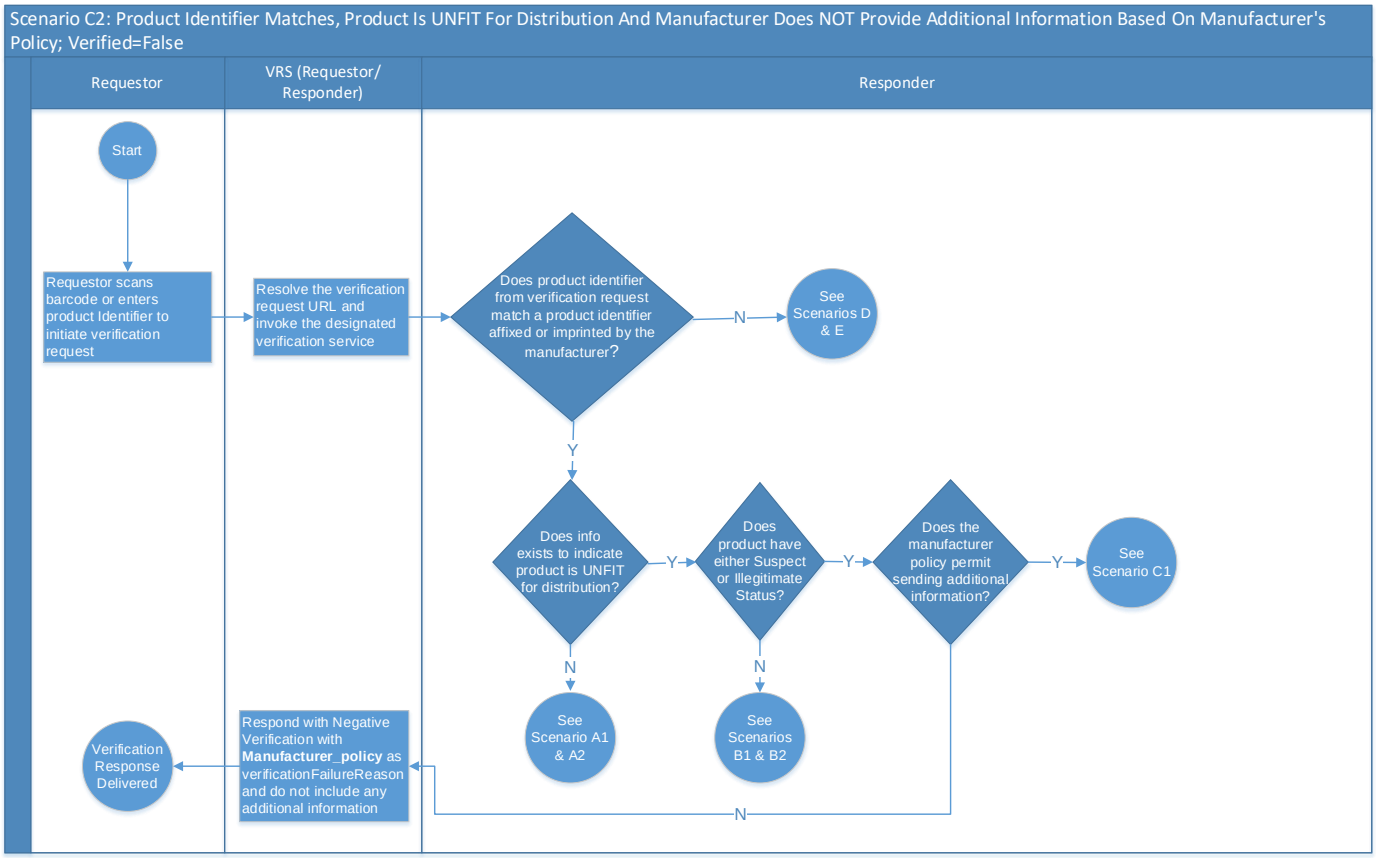


The example below illustrates a sample JSON response to a request for verification of a product identifier following negative verification, with "`Manufacturer_policy`" as reason for failure without providing any additional information. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

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The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following negative verification, with "Manufacturer_policy" as reason for failure without providing any additional information. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder's email contact is someone@somenet.com. Since the Responder's telephone contact is unknown, it is omitted. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com"
},
"data" : {
"verified": false,
"verificationFailureReason": "Manufacturer_policy"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.10 Scenario D

In Scenario D, the product Identifier does not match a value in the Responder's repository. The Responder returns a false verification response and provides "No_reason_provided" as a reason for the verification failure.


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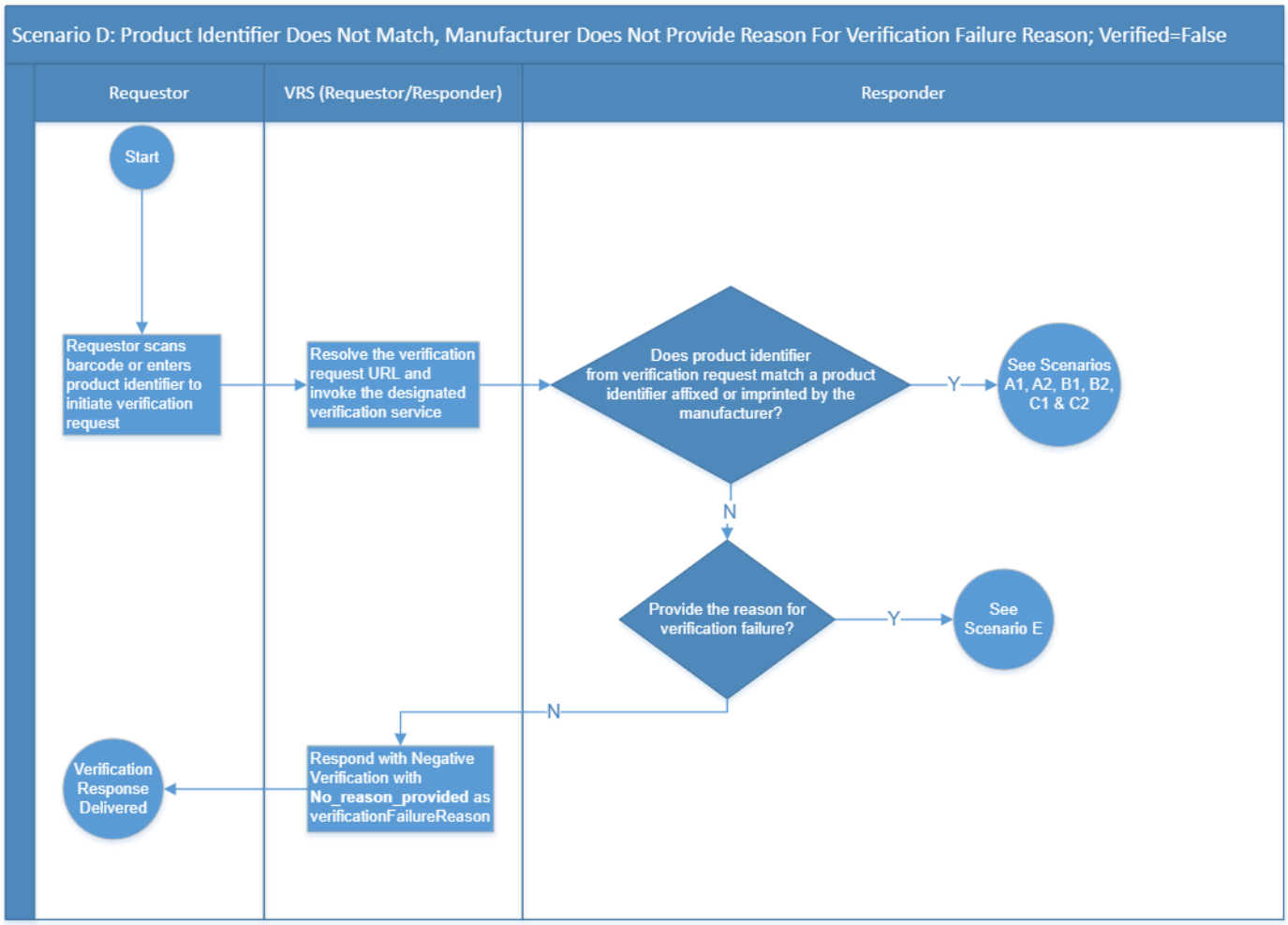


The example below illustrates a sample JSON response to a request for verification of a product identifier following failure of verification, with "`No_reason_provided`" as reason for failure. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder provides both telephone contact as `001-937-435-3870 EXT123` and email contact as `someone@somenet.com`.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com",
"telephone": "001-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "No_reason_provided"
```

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```
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following failure of verification, with "No_reason_provided" as reason for failure. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder provides both telephone contact as 001-937-435-3870 EXT123 and email contact as someone@somenet.com. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com",
"telephone": "001-937-435-3870 EXT123"
},
"data" : {
"verified": false,
"verificationFailureReason": "No_reason_provided"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```

## 8.11 Scenario E

In Scenario E, the Product Identifier does not match a value in the Responder's repository. Besides "No_reason_provided", there are 4 other possible reasons listed in Section 8.2 for the product identifier mismatch: "No_match_GTIN_Serial", "No_match_GTIN_Serial_Lot_Expiry", "No_match_GTIN_Serial_Lot", "No_match_GTIN_Serial_Expiry". The specific example illustrated in this section shows the Responder returning a false verification response and providing "No_match_GTIN_Serial_Expiry" as a reason for the verification failure.


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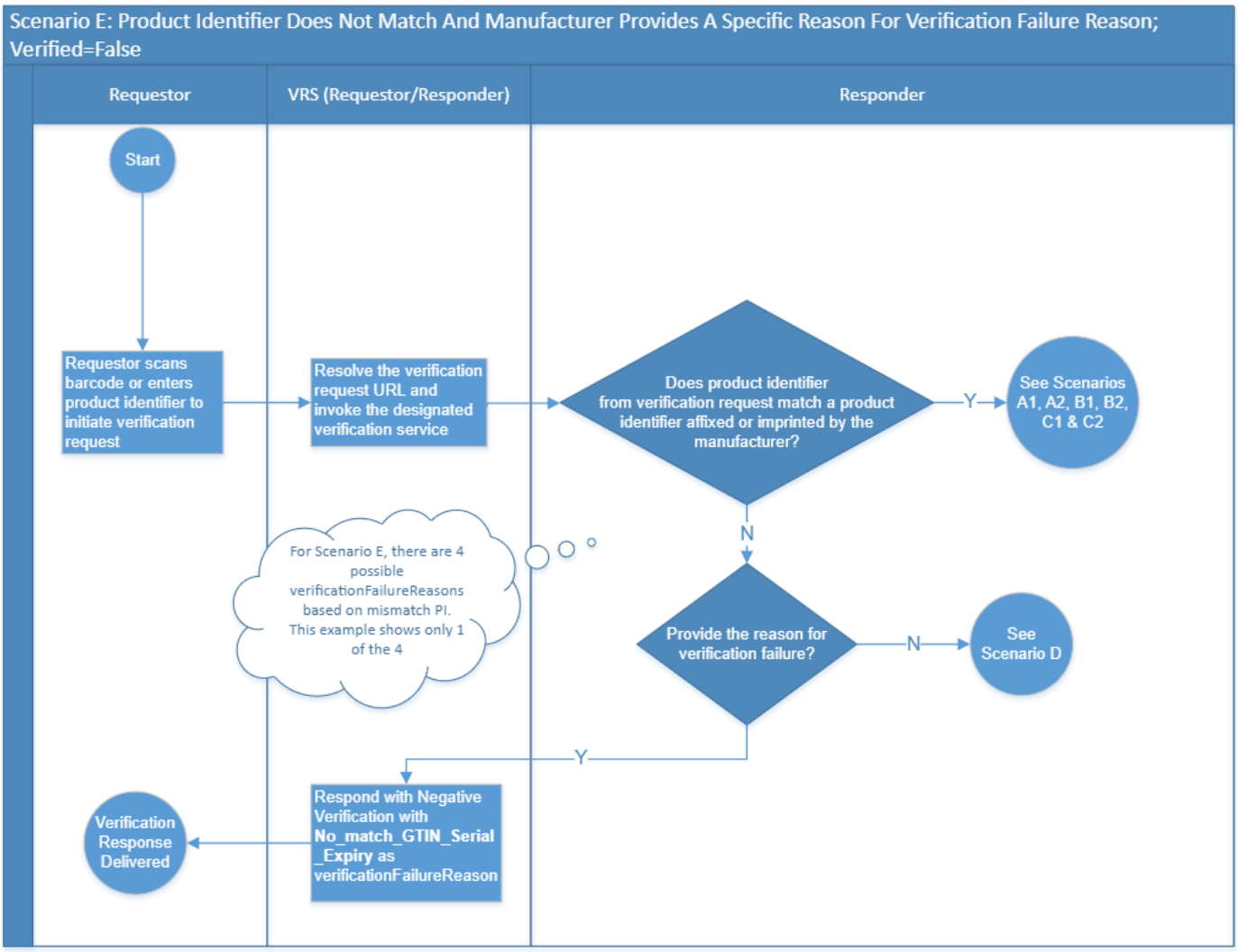


The example below illustrates a sample JSON response to a request for verification of a product identifier following failure of verification, providing "`No_match_GTIN_Serial_Expiry`" as failure reason for illustration purposes only**.** Note that this reason for failure is one of the other 4 possible choices. In this example, the Correlation UUID is `21EC2020-3AEA-4069-A2DD-08002B30309D`, the GLN of the manufacturer responding to the verification request is `0312231245676`, and the Responder provides both telephone contact as `0019374353870` and email contact as `someone@somenet.com`.

```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com",
"telephone": "0019374353870"
```

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```
},
"data" : {
"verified": false,
"verificationFailureReason": "No_match_GTIN_Serial_Expiry"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```


The example below includes an ATP verifiable credential in a sample JSON response to a request for verification of a product identifier following failure of verification, providing "No_match_GTIN_Serial_Expiry" as failure reason for illustration purposes only**.** Note that this reason for failure is one of the other 4 possible choices. In this example, the Correlation UUID is 21EC2020-3AEA-4069-A2DD-08002B30309D, the GLN of the manufacturer responding to the verification request is 0312231245676, and the Responder provides both telephone contact as 0019374353870 and email contact as someone@somenet.com. The ATP-Authorization header field contains the example Responder ATP Credential in JWT format.


```
HTTP 1.1 200 OK
Cache-Control: private, no-cache
Content-Type: application/json
GS1US-Version: 1.3.1
ATP-Authorization: eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz…
{
"verificationTimestamp": "2018-08-14T23:29:00.000-08:00",
"responderGLN": "0312231245676",
"contactPoint": {
"email": "someone@somenet.com",
"telephone": "0019374353870"
},
"data" : {
"verified": false,
"verificationFailureReason": "No_match_GTIN_Serial_Expiry"
},
"corrUUID": "21EC2020-3AEA-4069-A2DD-08002B30309D"
}
```


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# 9 Exception Handling

## 9.1 Potential list of HTTP status code responses returned when processing connectivity or verification requests

| Code | Description |
|---|---|
| 200 | A response code of 200 means the request was successful and details about the response can be found in the body of the response. Only a 200 response will issue a JSON payload. |
| 400 | Bad Request. The request was not formatted properly. |
| 401 | Unauthorized. The request was not allowed because the request did not pass authentication. |
| 403 | Forbidden. The request was valid, but the server is refusing to provide a response because the Requestor lacks permission. When ATP Verifiable Credential is provided in the header, credential is expired, revoked, or contains an invalid signature. |
| 404 | Not found. GTIN may be missing in Look-up Directory/Resolver or has an expired GTIN record in the Look-up Directory. |
| 405 | Method Not Allowed. The request method is not supported. |
| 408 | Request Timeout. The server timed out waiting for the request. |
| 500 | Internal Server Error. System failed to process the request because of an error inside the system. |
| 502 | Bad Gateway. The server was acting as a gateway or proxy and received an invalid response from the upstream server. Indicates that one server tried to use another VRS system and that system was down. |
| 503 | Service Unavailable. System is undergoing maintenance or is otherwise temporarily unavailable for API queries. |
| 504 | Gateway Timeout. The server, while acting as a gateway or proxy, performed multiple retries but did not receive a timely response from the upstream server specified by the URI (e.g. HTTP, FTP, LDAP) or some other auxiliary server (e.g. DNS) it needed to access in attempting to complete the request. |


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## 9.2 Potential resolution paths for HTTP status code responses

| HTTP Status Code | Suggested Resolution |
|---|---|
| 200 | None |
| 400 | Check that the request conforms to the specification, and re-issue the request in the correct format. |
| 401 | Check and obtain necessary authentication credentials. |
| 403 | Check and obtain necessary permission and credentials. When ATP Verifiable Credential is provided in the header, resolve your credential issue, and resubmit the request (see 9.4 Exception handling example for invalid credential). |
| 404 | Check URI format and correct resource paths and names. Contact Mfg. to confirm the GTIN exists. Contact verification service provider to ensure look-up directory is synchronized. |
| 405 | Check and correct method names and parameters. |
| 408 | Re-try sending the request to the server. If timeout continues, check connectivity request to server and contact verification service provider. |
| 500 | Contact Verification Service Provider. |
| 502 | Re-try sending the request to the server. Note that re-try could be limited to the credential presentation expiration. If timeout continues, check connectivity request to server and contact verification service provider. |
| 503 | Re-try sending the request to the server. Note that re-try could be limited to the credential presentation expiration. If timeout continues, check connectivity request to server and contact verification service provider. |
| 504 | Re-try sending the request to the server. Note that re-try could be limited to the credential presentation expiration. If timeout continues, check connectivity request to server and contact verification service provider. |

## 9.3 Exception handling example for GTIN not found

While it is expected for GTINs to be registered in a Look-up Directory (LD), it is possible, though unlikely, for the GTIN information to be missing from an LD. In the figure 9-1 below, we are describing an example of an exception handling process when the GTIN is not found in the LD. Although the GS1 Digital Link URI is syntactically valid, the LD has no information about the GTIN contained in the URI. Since there is no GTIN record in the LD, the verification request cannot be routed to any verification service. The verification request never makes it past the LD. Consequently, the response returned can neither be a positive, nor negative, verification response. Hence, the LD returns an HTTP status code of 404: Not Found. GTIN may be missing in Look-up Directory/Resolver.


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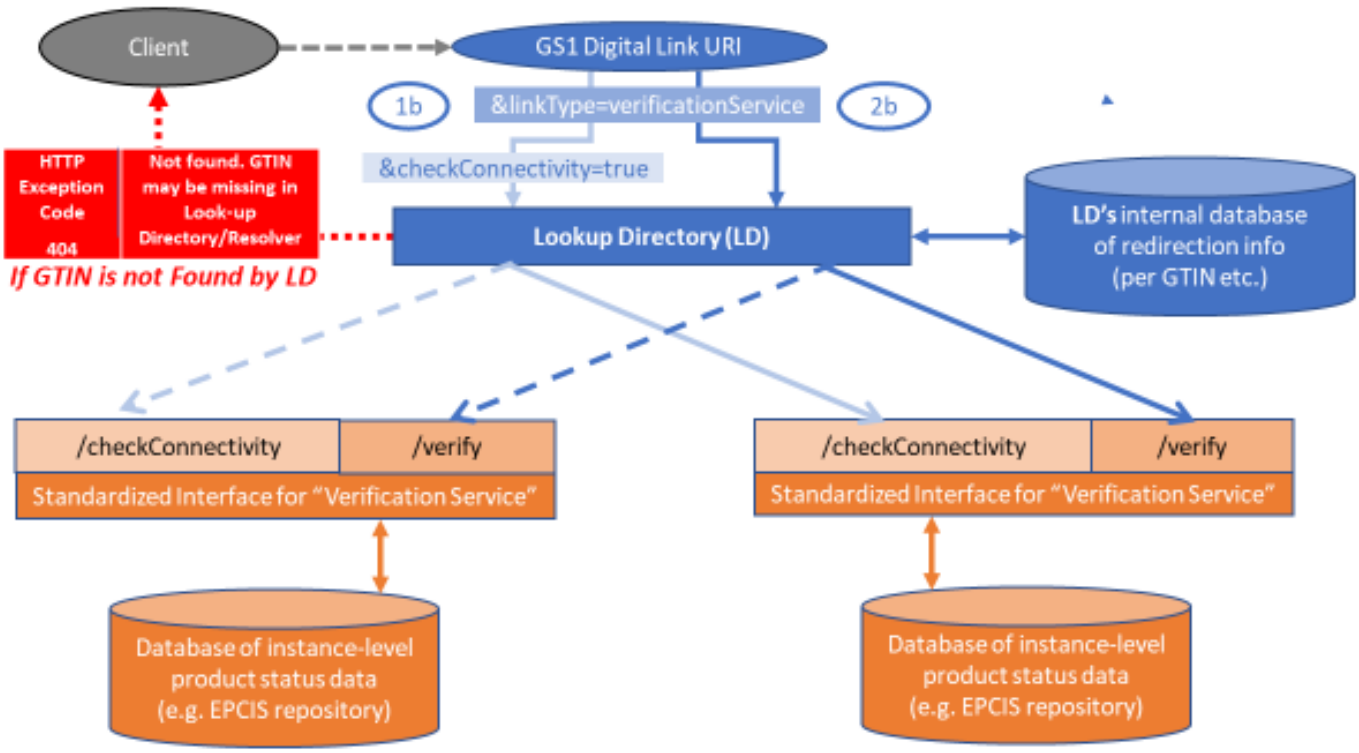
**Figure 9-1** An example of an exception handling process when the GTIN is not found in the Look-up Directory.




As shown in section 9.2, suggested resolution steps for a 404 HTPP status code response include:

- Checking URI format and correcting resource path and names
- Contacting manufacturer to confirm the GTIN exists
- Contacting your verification service provider to ensure the LD is synchronized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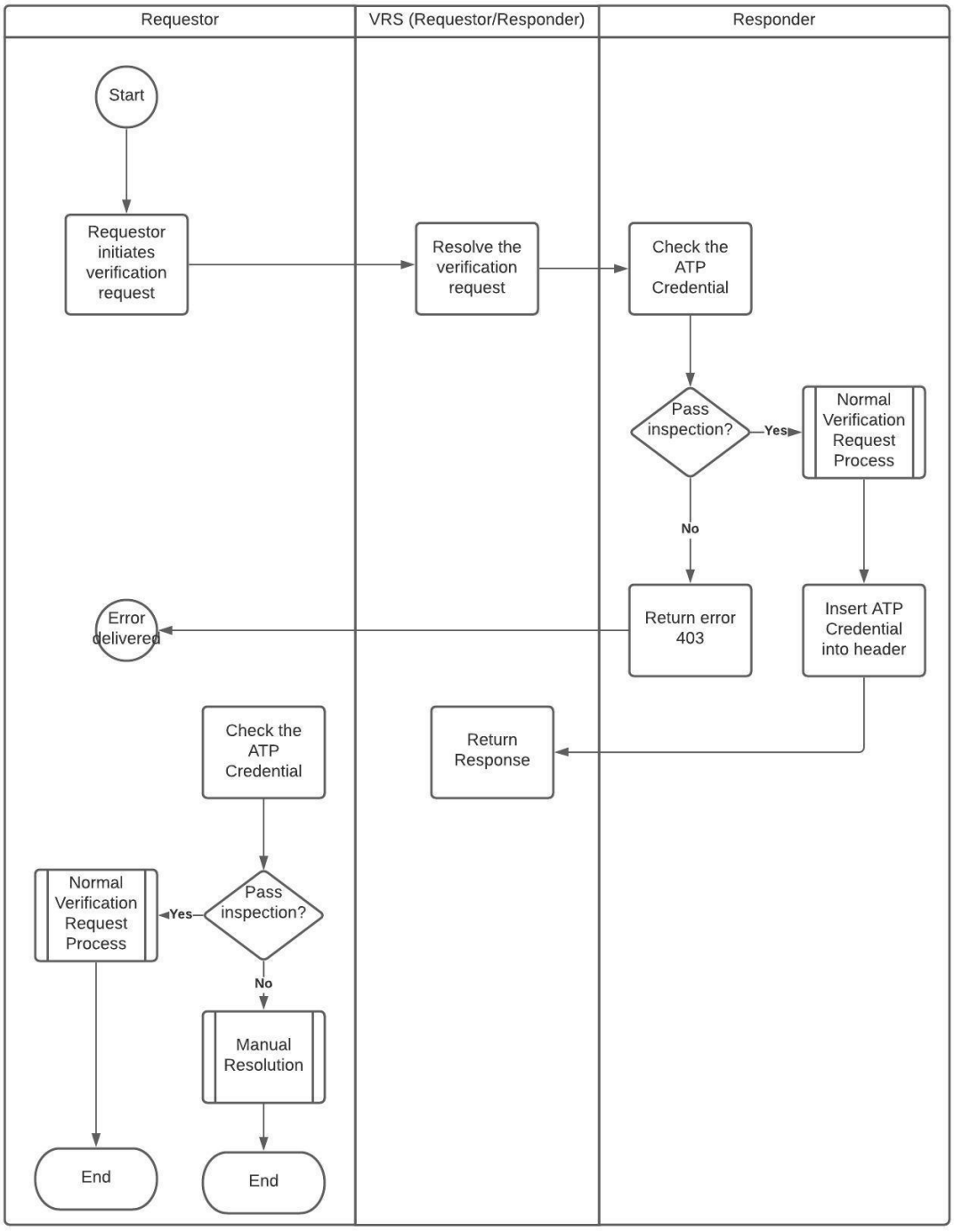
## 9.4 Exception handling example for invalid ATP credential




As shown in section 9.2, suggested resolution steps for a 403 HTTP status code when ATP Verifiable Credential is provided include:

- Contacting your verification service provider to verify: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- *the expiration date of the ATP Credential*
- *whether the issued ATP Credential has been revoked*
- *that the ATP Credential was issued by a valid ATP Credential Issuer*
- *the Issuer's Signature*

- Contacting Responder directly to resolve the issue


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# 10 Abbreviations and Terms

| Abbreviation | Term |
|---|---|
| ATP | Authorized Trading Partner as defined by DSCSA (A) in the case of a manufacturer or repackager having a valid registration in accordance with section 510;<br>(B) in the case of a wholesale distributor, having a valid license under State law or section 583, in accordance with section 582(a)(6), and complying with the licensure reporting requirements under section 503(e), as amended by the Drug Supply Chain Security Act.<br>(C) in the case of a third-party logistics provider, having a valid licenser under State law or section 584(a)(1), in accordance with section 582(a)(7), and complying with the licensure reporting requirements under section 584(b); and<br>(D) in the case of a dispenser, having a valid license under State law. |
| context | Parameter within each verification request which serves as a reference to a bundle of input parameters for the product identifier and selected master data attributes, as well as an interpretation (or reference to an interpretation) of the true/false response; for example, "`dscsaSaleableReturn`" indicates a verification application within the US DSCSA's provision for Verification of Saleable Returns. |
| DSCSA | Drug Supply Chain Security Act, comprising Title II of the DQSA, outlines steps to build an electronic, interoperable system to identify and trace certain prescription drugs as they are distributed in the United States. |
| EPCIS | Electronic Product Code Information Services, a GS1 and ISO Standard that defines a common data model for visibility data and interfaces for capturing and sharing visibility data within an enterprise and across an open supply chain. |
| FDA | Food and Drug Administration, a federal agency of the United States Department of Health and Human Services |
| GLN | Global Location Number, a GS1 identification key used to identify physical locations or parties. The key comprises a GS1 Company Prefix, location reference, and check digit. |
| GTIN | Global Trade Item Number, a GS1 identification key used to identify trade items. The key comprises a GS1 Company Prefix, an item reference and check digit. |
| HDA | Healthcare Distribution Alliance, the US national organization representing primary pharmaceutical distributors |
| HTTP | Hypertext Transfer Protocol, an application protocol for distributed, collaborative, hypermedia information systems |
| HTTPS | Hypertext Transfer Protocol Secure, an extension of the Hypertext Transfer Protocol (HTTP) for secure communication over a computer network, widely used on the Internet |
| invalid ATP credential | An invalid ATP credential is expired, revoked, or contains an invalid signature<br>▪ An expired ATP credential has an expiration date which is in the past<br>▪ A revoked ATP credential has a credential status that has been revoked by the issuer.<br>▪ A credential which contains an invalid signature is one with a material inconsistency in its composition, such as tampered data or where the public key cannot be verified against the private key. |
| JSON | JavaScript Object Notation, an open-standard file format that uses human-readable text to transmit data objects consisting of attribute–value pairs and array data types. |
| JSON-LD | JavaScript Object Notation for Linked Data, a method of encoding Linked Data using JSON. |
| JWT | JSON Web Token, is an industry standard (*RFC 7519*) compact token format for representing claims (i.e., W3C Verifiable Credentials) securely between two parties. |
| linkType | Specification of the nature of the information being linked to, to request a specific type of information or service; for example, "`verificationService`". |


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| | |
|---|---|
| Requestor | Party that submits a verification request; for example, in the context of "`dscsaSaleableReturn`", a pharmaceutical wholesale distributor. |
| Responder | Party that responds to a verification request; for example, in the context of "`dscsaSaleableReturn`", a pharmaceutical manufacturer or repackager. |
| REST | Representational State Transfer, an architectural style that defines a set of constraints to be used for creating web services. |
| SNI | Standardized Numerical Identifier, defined by the DSCSA as "a set of numbers or characters used to uniquely identify each package or homogenous case that is composed of the National Drug Code that corresponds to the specific product (including the particular package configuration) combined with a unique alphanumeric serial number of up to 20 characters." |
| URI | Uniform Resource Identifier, a string of characters that unambiguously identifies a particular resource |
| UUID | Universally Unique Identifier, a practically unique, 128-bit number used to identify information in computer systems. |
| VRS | Verification Router Service, potential method to meet the 2019 Saleable Returns DSCSA Requirements, designed to reference a returned pharmaceutical product's GTIN or associated GCP to automatically query the appropriate manufacturer's database and return a response in real-time. |


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# 11 Appendix

## 11.1 OpenAPI Schema (including JSON) for U.S. Verification Request & Response Requirements

You may access and download the OpenAPI Schema from the GS1 US website at *GS1 US Lightweight Verification Messaging OpenAPI* (**NEW - July 2023**)


```
{
  "openapi": "3.0.0",
  "info": {
    "version": "1.0.0",
    "title": "GS1 Verification Messaging Standard",
    "contact": {
      "name": "GS1",
      "url": "https://www.gs1.org",
      "email": "gsmp@gs1.org"
    },
    "description": "This the API specification for peer-to-peer communication between Verification Router Services or VRS",
    "x-GS1US-version": {
       "x-GS1US-description": "GS1US Version 1.3.1 incorporating changes needed to meet requirements of the Drug Supply Chain Security Act (DSCSA) and related use cases",
       "x-GS1US-versionNumber": "1.3.1"
    }
  },
  "servers": [
    {
      "url": "https://vrs.example.com/gateway/placeholder"
    }
  ],
  "paths": {
    "/checkConnectivity": {
      "get": {
        "tags": [
          "Test"
        ],
        "description": "Test connection to endpoints",
        "parameters": [
          {
            "name": "gtin",
            "in": "query",
            "description": "Global Trade Item Number",
            "required": true,
            "schema": {
              "$ref": "#/components/schemas/gtin"
            }
          },
          {
            "name": "reqGLN",
            "in": "query",
            "description": "Requestor GLN",
```


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```
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/gln"
          }
        },
        {
          "name": "linkType",
          "in": "query",
          "description": "Link Type",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/linkType"
          }
        },
        {
          "name": "context",
          "in": "query",
          "description": "Verification Context",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/context"
          }
        },
        {
          "name": "GS1US-Version",
          "in": "header",
          "description": "GS1 MO geographical LVMS Version defined in the #/info/x-GS1US-version/x-GS1US-
versionNumber field to enable verification request and response to meet US DSCSA verification requirements",
          "required": true,
          "schema": {
             "$ref": "#/components/schemas/GS1US-Version"
          }
        },
        {
          "name": "ATP-Authorization",
          "in": "header",
            "description": "Verifiable Credential of requestor",
            "required": false,
            "schema": {
              "$ref": "#/components/schemas/ATP-Authorization"
          }
        }
      ],
      "responses": {
        "200": {
          "headers": {
            "GS1US-Version": {
              "description": "The GS1US version of the LVMS. Should equal the version number listed in the info/x-
GS1US-version/x-GS1US-versionNumber field at the top of the file",
              "required": true,
              "schema": {
                "$ref": "#/components/schemas/GS1US-Version"
              }
```


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```
        },
        "ATP-Authorization": {
          "description": "The ATP credential to be passed in the HTTP header",
          "required": false,
          "schema": {
            "$ref": "#/components/schemas/ATP-Authorization"
          }
        }
      },
      "description": "A response code of 200 means the request was successful and details about the response can be found in the body of the response. Only a 200 response will issue a JSON payload.",
      "content": {
        "application/json": {
          "schema": {
            "$ref": "#/components/schemas/ConnectivityCheckResponse"
          }
        }
      }
    },
    "400": {
      "description": "Bad Request. The request was not formatted properly. Please verify the request conforms to the specification, and re-issue the request in the correct format."
    },
    "401": {
      "description": "Unauthorized. The request was not allowed because the request did not pass authentication."
    },
    "403": {
      "description": "Forbidden. The request was valid, but the server is refusing to provide a response because the requestor lacks permission. When ATP Verifiable Credential is provided in the header, credential is expired, revoked, or contains an invalid signature."
    },
    "404": {
      "description": "Not found. GTIN may be missing in Look-up Directory/Resolver Not found. GTIN may be missing in Look-up Directory/Resolver or has an expired GTIN record in the Look-up Directory."
    },
    "405": {
      "description": "Method Not Allowed. The request method is not supported."
    },
    "408": {
      "description": "Request Timeout. The server timed out waiting for the request."
    },
    "500": {
      "description": "Internal Server Error. System failed to process the request because of an error inside the system."
    },
    "502": {
      "description": "Bad Gateway. The server was acting as a gateway or proxy and received an invalid response from the upstream server. Indicates that one server tried to use another VRS system and that system was down."
    },
    "503": {
      "description": "Service Unavailable. System is undergoing maintenance or is otherwise temporarily unavailable for API queries."
    },
```


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```
        "504": {
          "description": "Gateway Timeout. The server, while acting as a gateway or proxy, performed multiple retries but did not receive a timely response from the upstream server specified by the URI (e.g. HTTP, FTP, LDAP) or some other auxiliary server (e.g. DNS) it needed to access in attempting to complete the request."
        }
      }
    }
  },
  "/verify/gtin/{gtin}/lot/{lot}/ser/{ser}": {
    "get": {
      "tags": [
        "Verification"
      ],
      "description": "Verification of a product identifier",
      "parameters": [
        {
          "name": "gtin",
          "in": "path",
          "description": "Global Trade Item Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/gtin"
          }
        },
        {
          "name": "lot",
          "in": "path",
          "description": "Lot/Batch Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/lotNum"
          }
        },
        {
          "name": "ser",
          "in": "path",
          "description": "Serial Number",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/serialNumber"
          }
        },
        {
          "name": "exp",
          "in": "query",
          "description": "Expiry",
          "required": true,
          "schema": {
            "$ref": "#/components/schemas/expiryDate"
          }
        },
        {
          "name": "linkType",
```


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```
    "in": "query",
    "description": "Link Type",
    "required": true,
    "schema": {
      "$ref": "#/components/schemas/linkType"
    }
  },
  {
    "name": "context",
    "in": "query",
    "description": "Verification Context",
    "required": true,
    "schema": {
      "$ref": "#/components/schemas/context"
    }
  },
  {
    "name": "reqGLN",
    "in": "query",
    "description": "Requestor GLN",
    "required": true,
    "schema": {
      "$ref": "#/components/schemas/gln"
    }
  },
  {
    "name": "corrUUID",
    "in": "query",
    "description": "Correlation UUID",
    "required": true,
    "schema": {
      "$ref": "#/components/schemas/uuid"
    }
  },
  {
    "name": "ctrlPossessAtt",
    "in": "query",
    "description": "Attestation of Control",
    "required": true,
    "schema": {
       "$ref": "#/components/schemas/ctrlPossessAtt"
    }
  },
  {
    "name": "email",
    "in": "query",
    "description": "email address of requestor",
    "required": false,
    "schema": {
       "$ref": "#/components/schemas/email"
    }
  },
  {
```


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```
        "name": "telephone",
        "in": "query",
        "description": "Telephone number of requestor",
        "required": false,
        "schema": {
          "$ref": "#/components/schemas/telephone"
        }
      },
      {
        "name": "GS1US-Version",
        "in": "header",
        "description": "GS1 MO geographical LVMS Version defined in the #/info/x-GS1US-version/x-GS1US-versionNumber field above to enable verification request and response to meet US DSCSA verification requirements",
        "required": true,
        "schema": {
          "$ref": "#/components/schemas/GS1US-Version"
        }
      },
      {
        "name": "ATP-Authorization",
        "in": "header",
         "description": "Verifiable Credential of requestor",
         "required": false,
         "schema": {
          "$ref": "#/components/schemas/ATP-Authorization"
        }
      }
    ],
    "responses": {
      "200": {
        "headers": {
          "GS1US-Version": {
            "description": "The GS1US version of the LVMS. Should equal the version number listed in the info/x-GS1US-version/x-GS1US-versionNumber field at the top of the file",
            "required": true,
            "schema": {
              "$ref": "#/components/schemas/GS1US-Version"
            }
          },
          "ATP-Authorization": {
            "description": "The ATP credential to be passed in the HTTP header",
            "required": false,
            "schema": {
              "$ref": "#/components/schemas/ATP-Authorization"
            }
          }
        },
        "description": "A response code of 200 means the request was successful and details about the response can be found in the body of the response. Only a 200 response will issue a JSON payload.",
        "content": {
          "application/json": {
            "schema": {
```


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```
            "oneOf": [
              {
                "$ref": "#/components/schemas/PositiveVerificationResponse"
              },
              {
                "$ref": "#/components/schemas/NegativeVerificationResponse"
              }
            ]
          }
        }
      }
    },
    "400": {
      "description": "Bad Request. The request was not formatted properly. Please verify the request conforms to the specification, and re-issue the request in the correct format."
    },
    "401": {
      "description": "Unauthorized. The request was not allowed because the request did not pass authentication."
    },
    "403": {
      "description": "Forbidden. The request was valid, but the server is refusing to provide a response because the requestor lacks permission.  When ATP Verifiable Credential is provided in the header, credential is expired, revoked, or contains an invalid signature."
    },
    "404": {
      "description": "Not found. GTIN may be missing in Look-up Directory/Resolver or has an expired GTIN record in the Look-up Directory."
    },
    "405": {
      "description": "Method Not Allowed. The request method is not supported."
    },
    "408": {
      "description": "Request Timeout. The server timed out waiting for the request."
    },
    "500": {
      "description": "Internal Server Error. System failed to process the request because of an error inside the system."
    },
    "502": {
      "description": "Bad Gateway. The server was acting as a gateway or proxy and received an invalid response from the upstream server. Indicates that one server tried to use another VRS system and that system was down."
    },
    "503": {
      "description": "Service Unavailable. System is undergoing maintenance or is otherwise temporarily unavailable for API queries."
    },
    "504": {
      "description": "Gateway Timeout. The server, while acting as a gateway or proxy, performed multiple retries but did not receive a timely response from the upstream server specified by the URI (e.g. HTTP, FTP, LDAP) or some other auxiliary server (e.g. DNS) it needed to access in attempting to complete the request."
    }
  }
}
```


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```
    }
  },
  "components": {
    "schemas": {
      "gln": {
        "type": "string",
        "minLength": 13,
        "maxLength": 13,
        "example": "9071404000002",
        "pattern": "^\\d{13}$"
      },
      "gtin": {
        "type": "string",
        "minLength": 8,
        "maxLength": 14,
        "example": 175304202,
        "pattern": "^\\d{12,14}|\\d{8}$"
      },
      "lotNum": {
        "type": "string",
        "description": "Lot number for the asset to be verified",
        "example": "LZ109B15",
        "pattern": "^10([\\x21-\\x22\\x25-\\x2F\\x30-\\x39\\x3A-\\x3F\\x41-\\x5A\\x5F\\x61-\\x7A]{0,20})$"
      },
      "serialNumber": {
        "type": "string",
        "description": "Serial number for the asset to be verified",
        "example": "XYZ12345AB",
        "pattern": "^21([\\x21-\\x22\\x25-\\x2F\\x30-\\x39\\x3A-\\x3F\\x41-\\x5A\\x5F\\x61-\\x7A]{0,20})$"
      },
      "expiryDate": {
        "type": "string",
        "description": "Date of expiry for the item to be looked up in format YYMMDD",
        "minLength": 6,
        "maxLength": 6,
        "example": "230728",
        "pattern": "^\\d{6}$"
      },
      "uuid": {
        "type": "string",
        "description": "Universally Unique Identifier (UUID) Version 4",
        "example": "59bc5c88-15f7-49a7-9687-73b05d2c50a4",
        "pattern": "^[a-fA-F\\d]{8}-[a-fA-F\\d]{4}-4[a-fA-F\\d]{3}-[89abAB][a-fA-F\\d]{3}-[a-fA-F\\d]{ 12}$"
      },
      "timestamp": {
        "type": "string",
        "description": "A timestamp to millisecond precision, with an explicit timezone indicator (+/-hh:mm) relative to
UTC",
        "example": "2018-08-14T23:29:00.000-08:00",
        "pattern": "^[0-9]{4}-(0[1-9]|1[0-2])-(0[1-9]|[1-2][0-9]|3[0-1])T(2[0-3]|[01][0-9]):[0-5][0-9] :[0-5][0-9]\\.[0-
9]{3}(Z|((\\+|\\-)((0[0-9]|1[0-3]):([0-5][0-9])|14:00)))"
      },
      "linkType": {
```


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```
      "type": "string",
      "enum": [
        "verificationService"
      ],
      "example": "verificationService"
    },
    "context": {
      "type": "string",
      "enum": [
        "dscsaSaleableReturn",
        "dscsaStatusCheck",
        "dscsaExceptionVerification",
        "dscsaSuspectIllegitimate"
      ],
      "example": "dscsaSaleableReturn"
    },
    "ctrlPossessAtt": {
      "type": "boolean",
      "description": "Requestor is making an attestation that they have possession or control of the product if a value of true is supplied.",
      "enum": [
        true,
        false
      ],
      "example": true
    },
    "email": {
      "type": "string",
      "description": "Email of contact point responsible for verification request or response",
      "example": "anyone@anynet.com"
    },
    "telephone": {
      "type": "string",
      "maxLength": 30,
      "description": "Telephone number of contact point responsible for verification request or response. It is recommended for US based telephone numbers that the value be represented in the hyphenated standard 11 digit format and for an international number to include the appropriate international direct dial code. When adding phone extensions, use the abbreviation of EXT and then follow with the appropriate telephone number format.",
      "example": "1-937-435-3870"
    },
    "GS1US-Version": {
      "type": "string",
      "description": "The GS1US version of the LVMS. Should equal the version number listed in the info/x-GS1US-version/x-GS1US-versionNumber field at the top of the file",
      "default": "1.3.1",
      "example": "1.3.1",
      "pattern": "^[0-9]{1}.[0-9]{1}.[0-9]{1}$"
    },
    "ATP-Authorization": {
      "type": "string",
      "description": "Verifiable credential being passed to prove ATP status, java web token using base64 encoding",
      "example": "eyJ0eXAiOiJqd3QiLCJhbGciOiJFUz..."
```


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```
    },
    "positiveVerificationStatus": {
      "type": "boolean",
      "description": "Please refer to the rules defined for the context for further details of what constitutes successful verification. If verification succeeds, use true.",
      "example": true,
      "enum": [
        true
      ]
    },
    "negativeVerificationStatus": {
      "type": "boolean",
      "description": "Please refer to the rules defined for the context for further details of what constitutes unsuccessful verification. If verification fails, use false and select a value for 'verificationFailureReason'.",
      "example": false,
      "enum": [
        false
      ]
    },
    "verificationFailureReason": {
      "type": "string",
      "description": "Mandatory if verification failed. Used to indicate which PI element(s) did not match, or to indicate that no reason has been provided (at the discretion of the responder. Values: 'Manufacturer_policy': 'Pharmaceutical manufacturers may have different internal policies, which will return a Verified true, or false for the same conditions or determines whether to return additional information with the verification response.', 'No_match_GTIN_Serial': 'No match between GTIN and Serial Number', 'No_match_GTIN_Serial_Lot': 'No match between (GTIN and Serial Number) and Lot Number', 'No_match_GTIN_Serial_Expiry': 'No match between (GTIN and Serial Number) and Expiry Date', 'No_match_GTIN_Serial_Lot_Expiry': ' No match between (GTIN and Serial Number) and Lot Number and Expiry Date', 'No_reason_provided', 'Not_for_re-distribution': 'The pharmaceutical manufacturer notifies the Requestor that the product is Suspect and Not for re-distribution"',
      "enum": [
        "Manufacturer_policy",
        "No_match_GTIN_Serial",
        "No_match_GTIN_Serial_Lot",
        "No_match_GTIN_Serial_Expiry",
        "No_match_GTIN_Serial_Lot_Expiry",
        "No_reason_provided",
        "Not_for_re-distribution"
      ],
      "example": "No_match_GTIN_Serial_Lot"
    },
    "additionalInformation": {
      "type": "string",
      "description": "Optional. May be used to provide additional information of the state of the SGTIN, for example, recalled. Instead of including an empty string or null, do NOT include this field unless is populated with a descriptive, standardised text value. Values: 'Expired' - The product has an expiration date which is in the past; 'ExpirationExtended' - The product has had its expiration date extended by the FDA; 'Recalled' - Product has been recalled or withdrawn; 'Suspect' - The product's authenticity or integrity is considered suspect by the responder; 'Illegitimate' - The product's authenticity or integrity is considered illegitimate by the Responder. THIS IS NOT A FREE TEXT DESCRIPTION. Additional values will be standardised in the future. NOTE THAT EPCIS IS THE PREFERRED MECHANISM FOR INDICATING CHANGES IN PRODUCT DISPOSITION (e.g., recalled, stolen, decommissioned).",
      "enum": [
```


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```
      "Expired",
      "ExpirationExtended",
      "Recalled",
      "Suspect",
      "Illegitimate"
    ]
  },
  "ConnectivityCheckResponse": {
    "required": [
      "responderGLN"
    ],
    "properties": {
      "responderGLN": {
        "$ref": "#/components/schemas/gln"
      }
    }
  },
  "PositiveVerificationResponse": {
    "required": [
      "verificationTimestamp",
      "corrUUID",
      "responderGLN",
      "contactPoint",
      "data"
    ],
    "properties": {
      "verificationTimestamp": {
        "$ref": "#/components/schemas/timestamp"
      },
      "corrUUID": {
        "$ref": "#/components/schemas/uuid"
      },
      "responderGLN": {
        "$ref": "#/components/schemas/gln"
      },
      "contactPoint": {
        "type": "object",
        "properties": {
          "email": {
            "$ref": "#/components/schemas/email"
          },
          "telephone": {
            "$ref": "#/components/schemas/telephone"
          }
        },
        "anyOf": [
          {"required": ["email"]},
          {"required": ["telephone"]}
        ]
      },
      "data": {
        "type": "object",
        "properties": {
```


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```
        "verified": {
          "$ref": "#/components/schemas/positiveVerificationStatus"
        },
        "additionalInfo": {
          "$ref": "#/components/schemas/additionalInformation"
        }
      },
      "required": [
        "verified"
      ]
    }
  }
},
"NegativeVerificationResponse": {
  "required": [
    "verificationTimestamp",
    "corrUUID",
    "responderGLN",
    "contactPoint",
    "data"
  ],
  "properties": {
    "verificationTimestamp": {
      "$ref": "#/components/schemas/timestamp"
    },
    "corrUUID": {
      "$ref": "#/components/schemas/uuid"
    },
    "responderGLN": {
      "$ref": "#/components/schemas/gln"
    },
    "contactPoint": {
      "type": "object",
      "properties": {
          "email": {
              "$ref": "#/components/schemas/email"
          },
          "telephone": {
              "$ref": "#/components/schemas/telephone"
          }
      },
      "anyOf": [
        {"required": ["email"]},
        {"required": ["telephone"]}
      ]
    },
    "data": {
      "type": "object",
      "properties": {
        "verified": {
          "$ref": "#/components/schemas/negativeVerificationStatus"
        },
        "verificationFailureReason": {
```


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```
            "$ref": "#/components/schemas/verificationFailureReason"
          },
          "additionalInfo": {
            "$ref": "#/components/schemas/additionalInformation"
          }
        },
        "required": [
          "verified",
          "verificationFailureReason"
        ]
      }
    }
  }
}
```



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## 11.2 Unreserved and Reserved Characters

Characters that are allowed in a URI but do not have a reserved purpose are called unreserved.

unreserved = ALPHA / DIGIT / "-" / "." / "_" / "~" [10]

Many URI include components consisting of or delimited by certain special characters. These characters are called "reserved" since their usage within the URI component is limited to their reserved purpose. If the data for a URI component would conflict with the reserved purpose, then the conflicting data must be escaped before forming the URI.

reserved = ":" / "/" / "?" / "#" / "[" / "]" / "@" / "!" / "$" / "&" / "'" / "(" / ")"/ "*" / "+" / "," / ";" / "=" [11]

[10] RFC 3986 section 2.3 Unreserved Characters (January 2005) https://datatracker.ietf.org/doc/html/rfc3986#section-2.2
[11] RFC 3986 section 2.2 Reserved Characters (January 2005) https://datatracker.ietf.org/doc/html/rfc3986#section-2.2

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## IAPMO

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